

PREDICTING DYSCALCEMIA AT 4 DAYS IN MILK USING ACTIVITY AND RUMINATION DATA IN MULTIPAROUS HOLSTEIN COWS

Claira R. Seely & Jessica A.A. McArt

Department of Population Medicine and Diagnostic Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY

INTRODUCTION:

- Dyscalcemia (DYS), reduced blood Ca at 4 DIM unaccompanied by signs of disease, is associated with reduced intake, milk production, and reproductive success and increased risk of disease
- Ca is required for rumen contraction
- Rumination and activity times have been used to detect ketosis, metritis, and displaced abomasum

OBJECTIVES:

- Explore differences in RT and AT during the periparturient period between cows with and without DYS
- Predict DYS using RT and AT variables at clinically relevant timepoints

METHODS:

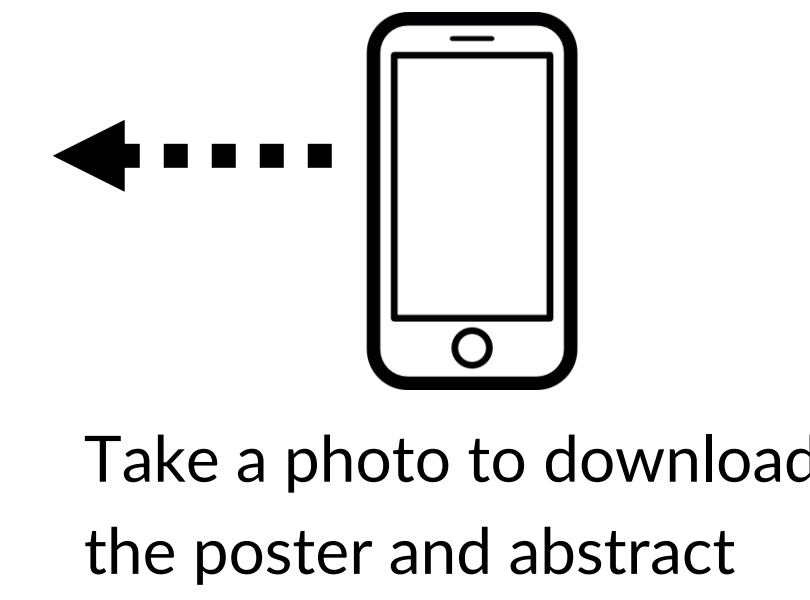
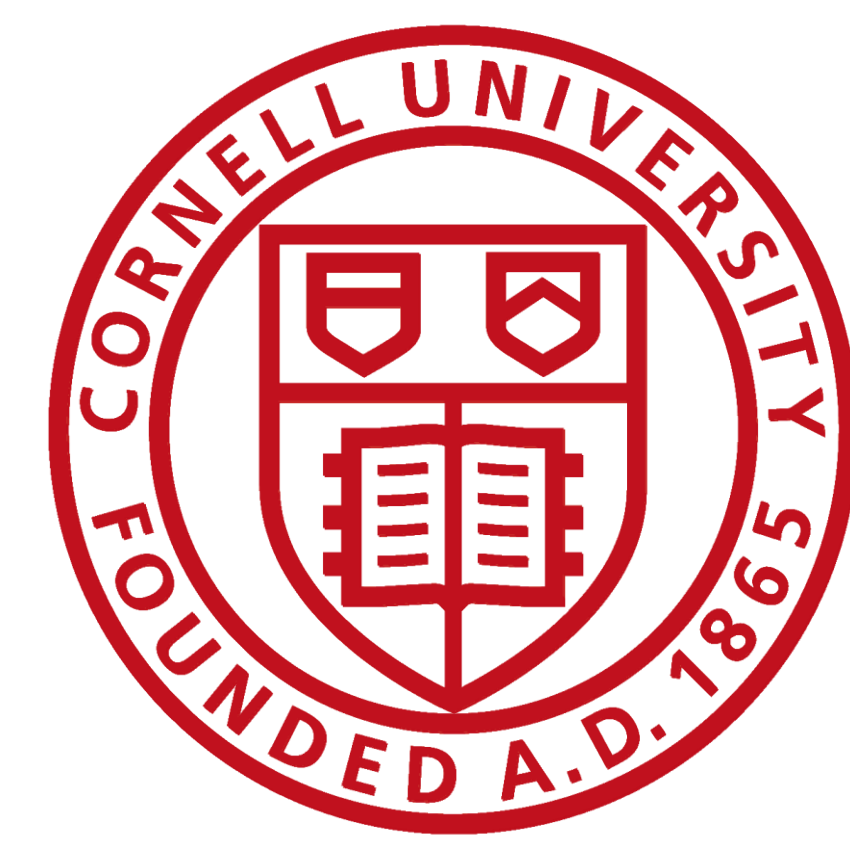
- 182 multiparous Holstein cows, 2 NY herds
- Rumination (min/d; RT) and activity (arbitrary units (AU)/d; AT) time recorded by ear or neck loggers for 14 d prepartum and 14 d postpartum
- Blood collected for serum total Ca (tCa) 4 DIM
- No supplemental Ca administered

Dyscalcemia diagnosis

- Dyscalcemia (DYS; n = 57)
4 DIM tCa \leq 2.2 mmol/L
- Eucalcemia (EU; n = 125)
4 DIM tCa $>$ 2.2 mmol/L

Statistical analysis (SAS v. 9.4)

- Generalized linear mixed models to assess differences in RT and AT for 14 d prepartum and 14 d postpartum between DYS and EU cows
- Logistic regression models to predict DYS at 4 DIM using RT and AT variables at 1, 2, 3, and 4 DIM



Claira R. Seely
crs336@cornell.edu
Abstract # 1079M



Postpartum rumination and activity times are decreased in cows with dyscalcemia at 4 days in milk.

Rumination and activity time variables are predictive of postpartum calcemic status.

RESULTS: PREDICTIVE MODEL

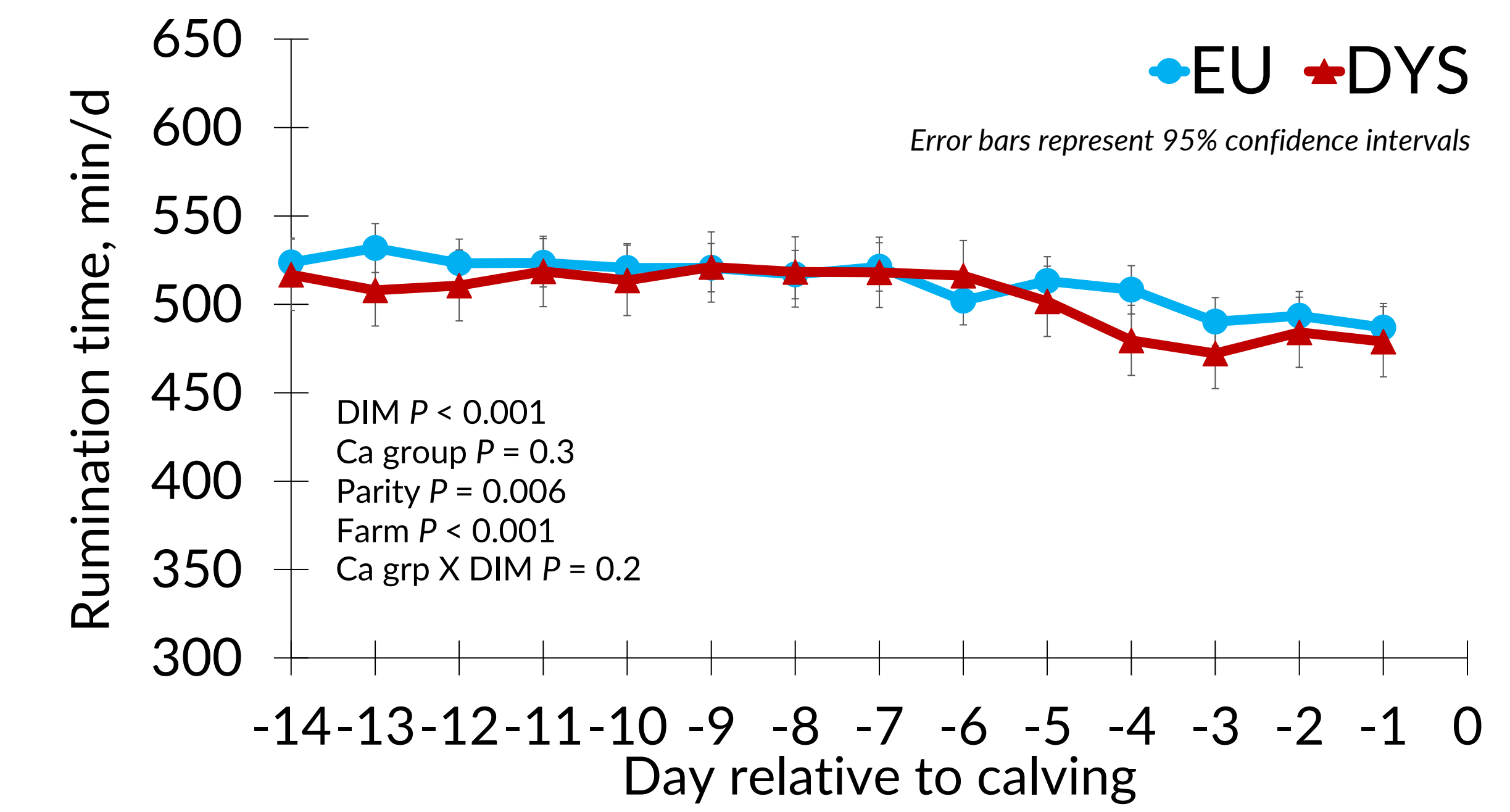
Table 1. Logistic regression models predicting dyscalcemia (blood tCa \leq 2.2 mmol/L at 4 DIM) through rumination and activity time variables from multiparous Holstein cows (n = 182)

Model	Variables	R ²	AUC ^a , %	Se ^b , %	Sp ^c , %	Acc ^d , %
Model 1	raw RT ^e & AT ^e	0.30	0.79	37.5 \pm 12.5	93.6 \pm 5.8	76.2 \pm 6.9
Model 2	daily Δ RT ^e & daily Δ AT ^e	0.31	0.79	39.3 \pm 12.8	92.0 \pm 6.2	75.7 \pm 6.9
Model 3	daily Δ RT ^e & raw AT ^e	0.31	0.79	44.6 \pm 13.3	93.6 \pm 5.8	78.5 \pm 7.3
Model 4	daily Δ RT ^e , prepartum RT ^f , & raw AT ^e	0.31	0.79	39.3 \pm 12.8	92.0 \pm 6.2	75.7 \pm 7.9
Model 5	daily Δ RT ^e , farm average RT ^g , & raw AT ^e	0.21	0.75	30.4 \pm 11.6	92.0 \pm 6.2	72.9 \pm 7.1
Model 6	daily Δ RT ^e , 0 DIM RT, & raw AT ^e	0.30	0.80	46.4 \pm 13.4	92.0 \pm 6.2	77.9 \pm 6.7

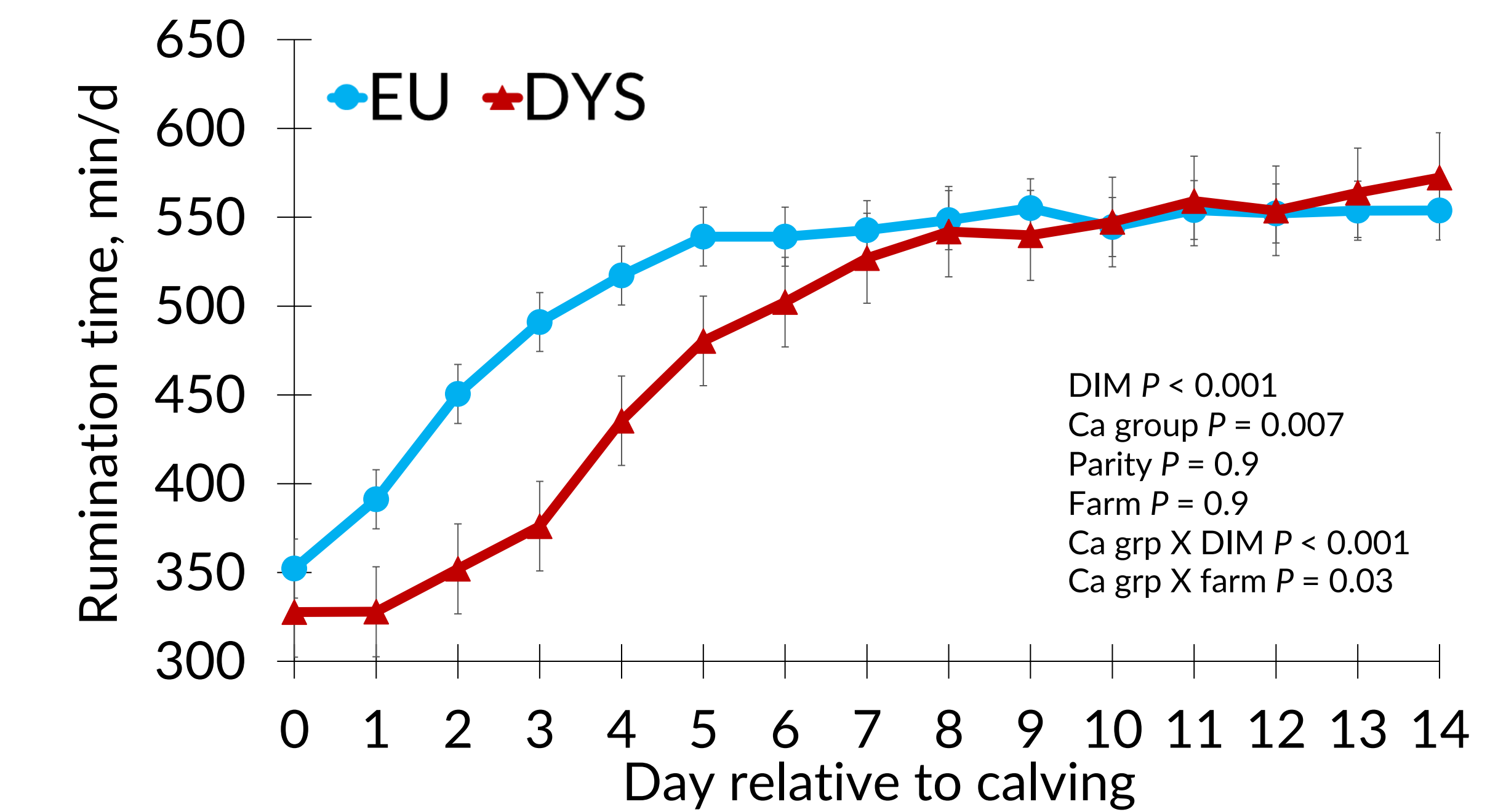
^aArea under the curve; ^bSensitivity; ^cSpecificity; ^dAccuracy; ^e1, 2, 3, 4 DIM; ^f-14 to -1 DIM; ^gFarm average RT from -14 to -1 DIM

RESULTS: RUMINATION AND ACTIVITY TIME

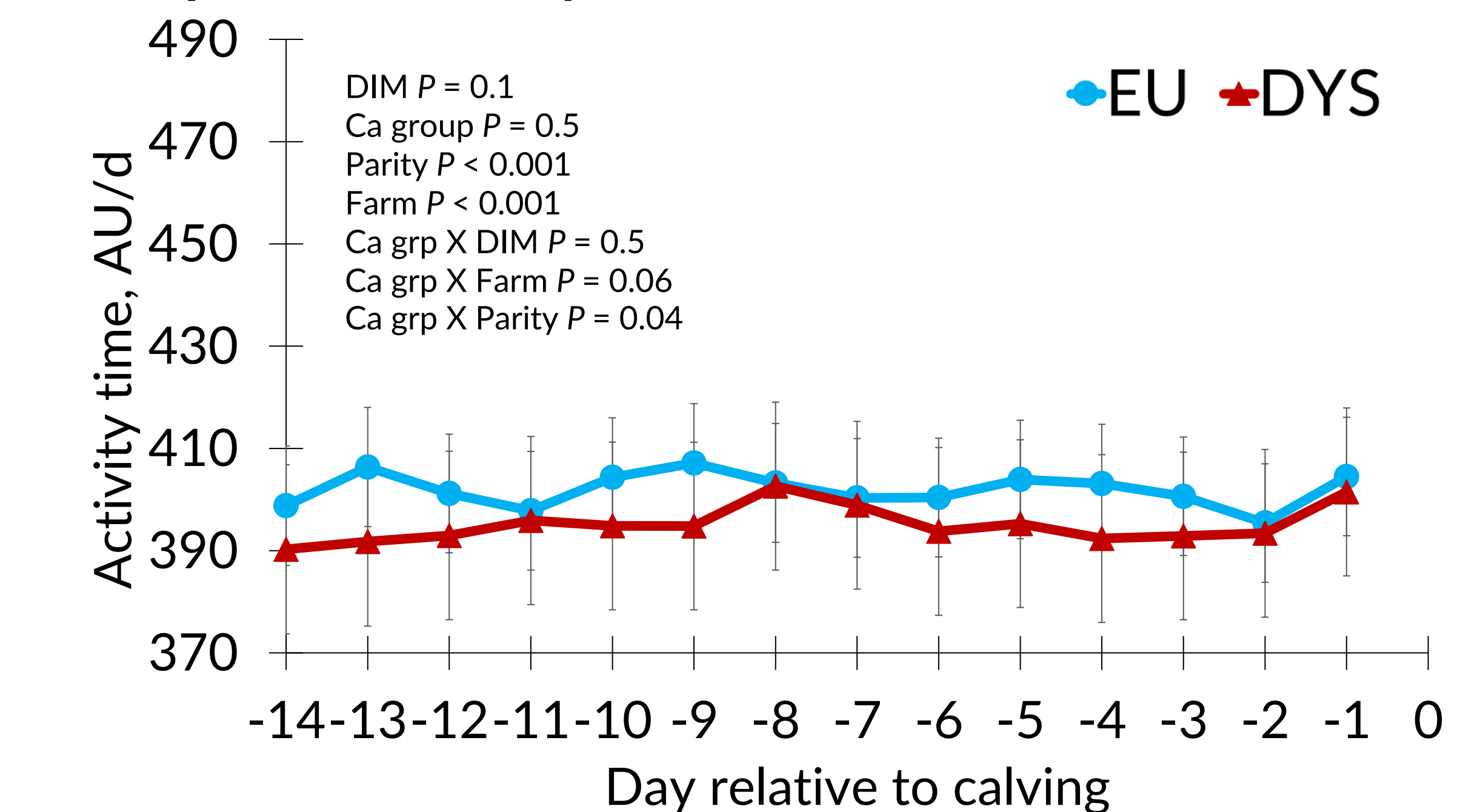
Prepartum Rumination time



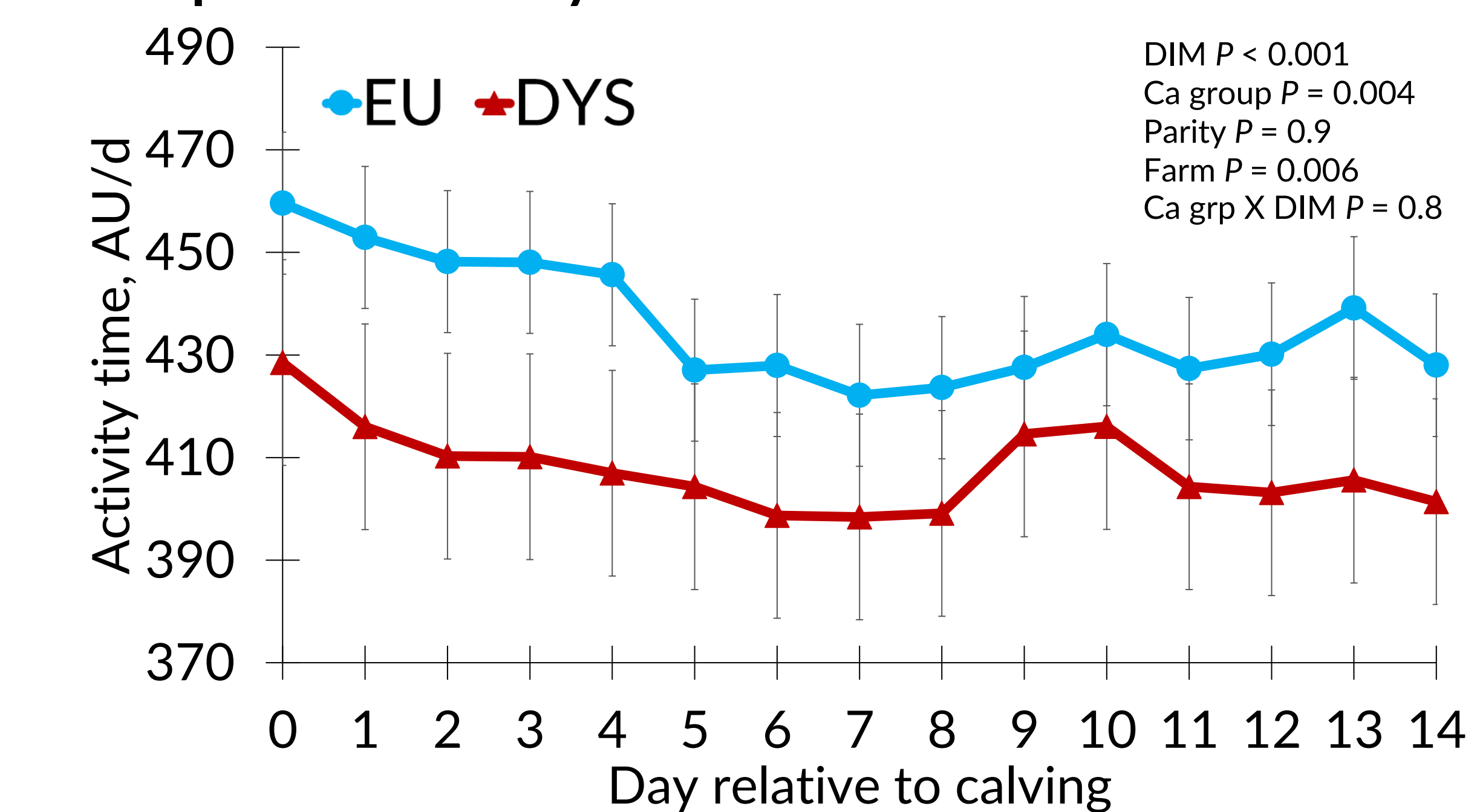
Postpartum Rumination time



Prepartum Activity time



Postpartum Activity time



ACKNOWLEDGEMENTS:

This work is supported by the Cornell Institute of Digital Agriculture and Cornell University Research in Animal Health. The authors thank the participating farms and Katie Callero, Kaitlyn Fang, Ian Frost, Annaliese Hines, Sadie Hubler, Hannah McCray, Abby Reid, Jackson Seminara, and Cassandra Wilbur (Cornell University) for their assistance with sample collection.