



Overstocking dairy cows during the dry period affects dehydroepiandrosterone and cortisol secretion



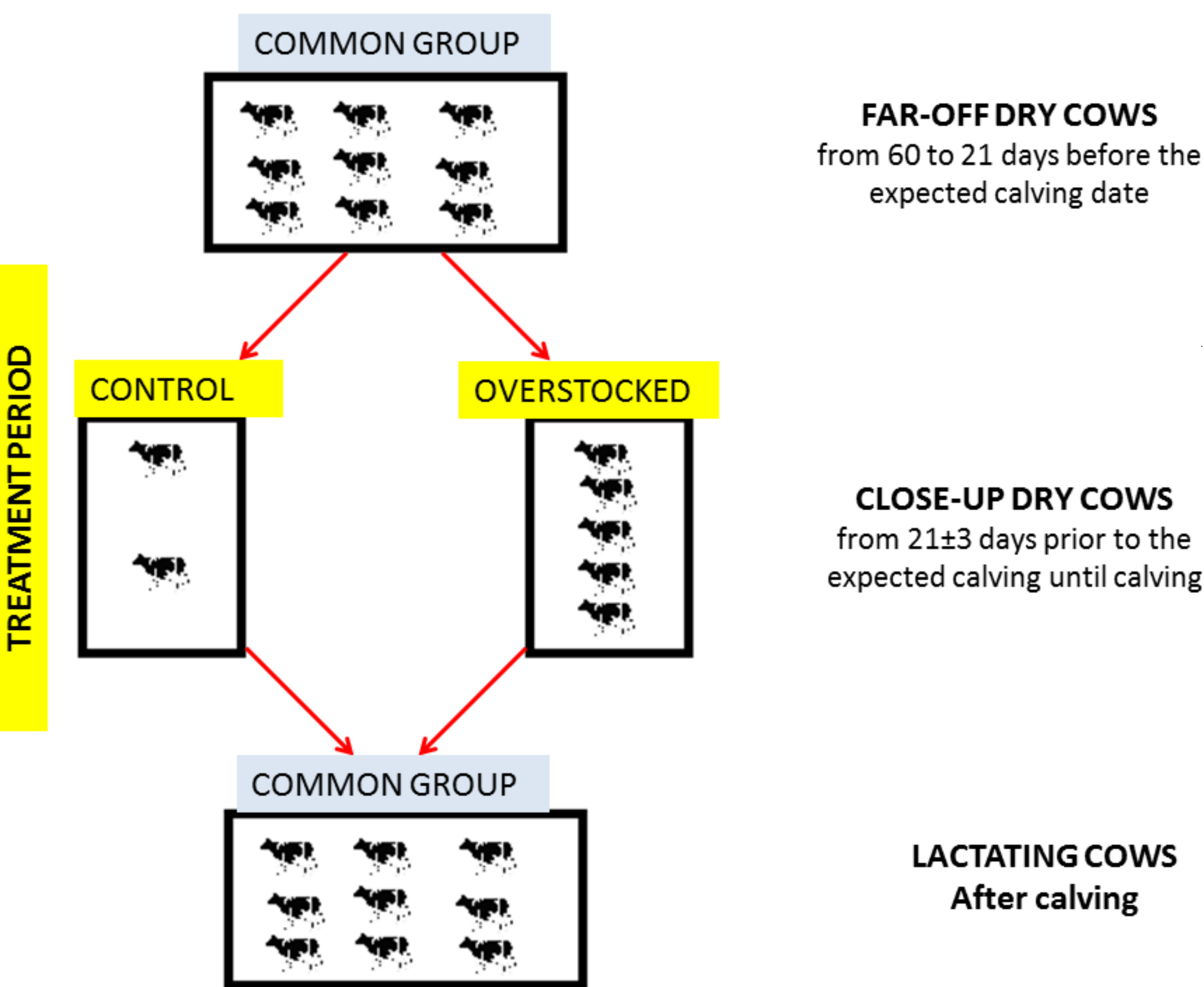
M. Fustini*, A. Palmonari*, G. Galeati*, G. Gabai†, D. Bucci* and A. Formigoni*

*Department of Veterinary Medical Sciences (DIMEVET), University of Bologna, 40062 Ozzano dell'Emilia (BO), Italy
†Department of Comparative Biomedicine and Food Science, University of Padua, 35020 Legnaro (PD), Italy.

Objective

Stressful situations trigger a number of changes such as the secretion of cortisol (C) and dehydroepiandrosterone (DHEA) from the adrenal cortex, in response to adrenocorticotropic hormone (ACTH). Moreover, increased stocking density is a common source of stress for animals.

We investigated whether overstocking during the dry period (from 21±3 days to the expected calving until calving) affects DHEA and C secretion and behavior in Holstein Friesian cows.

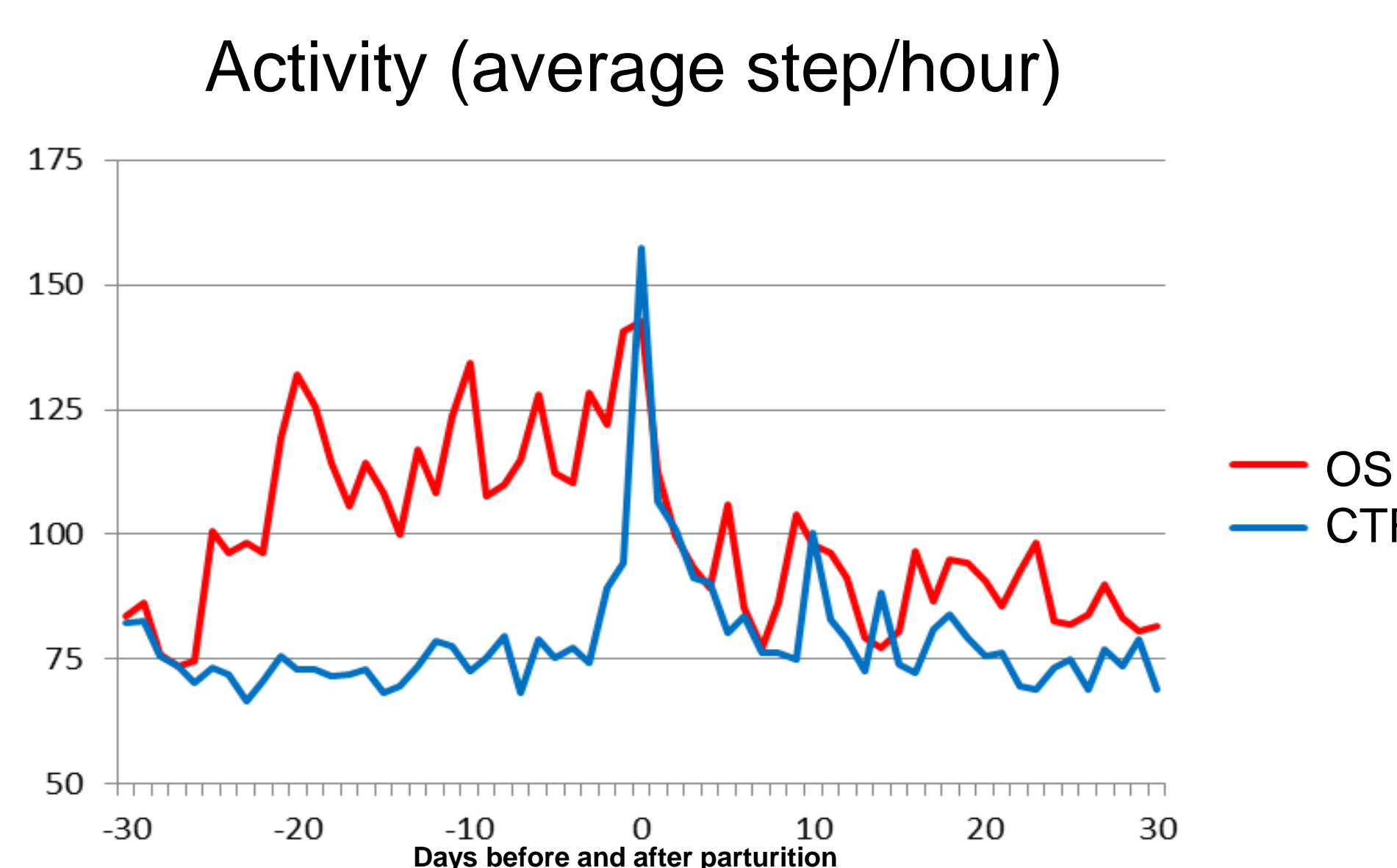
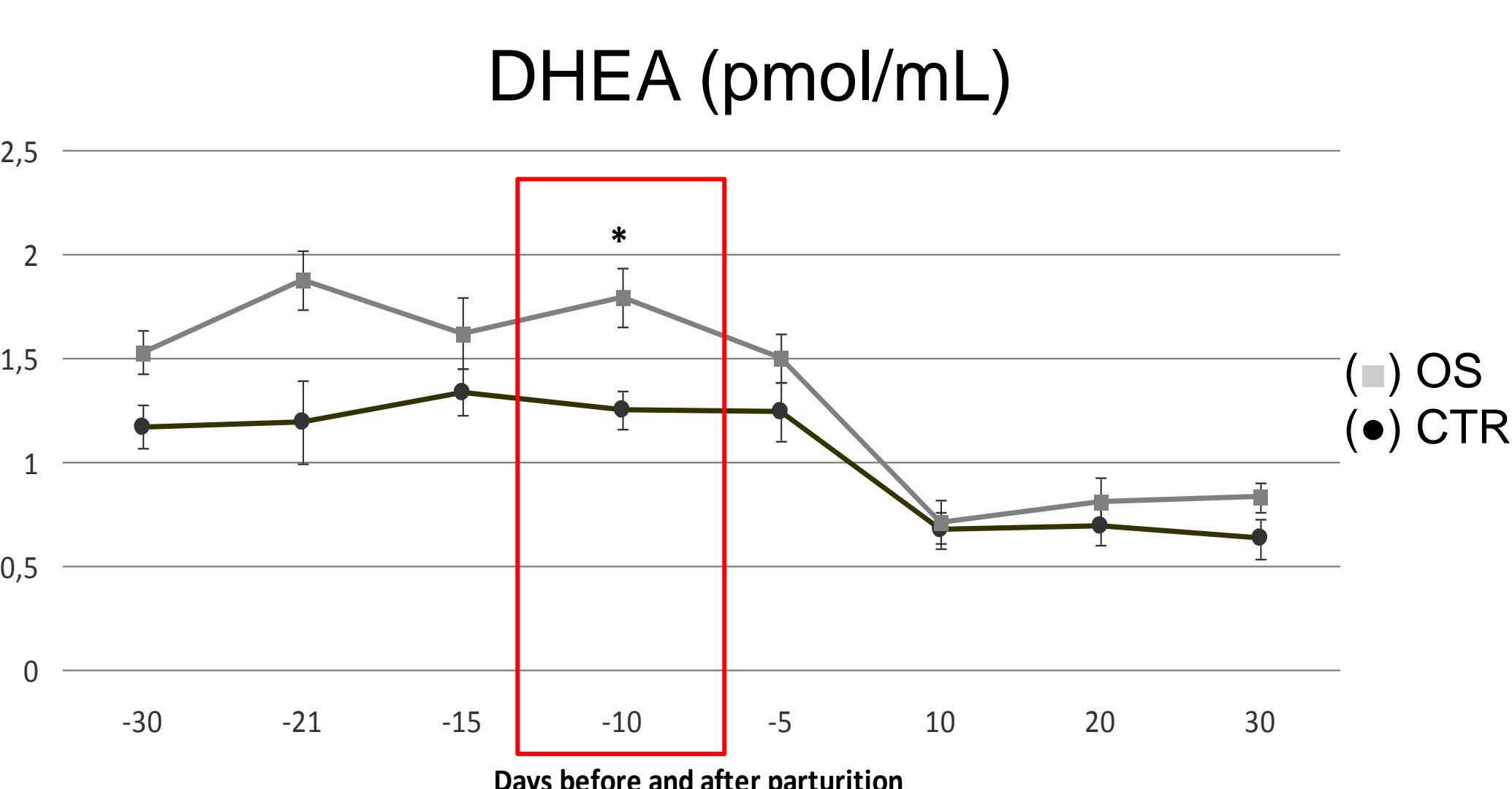
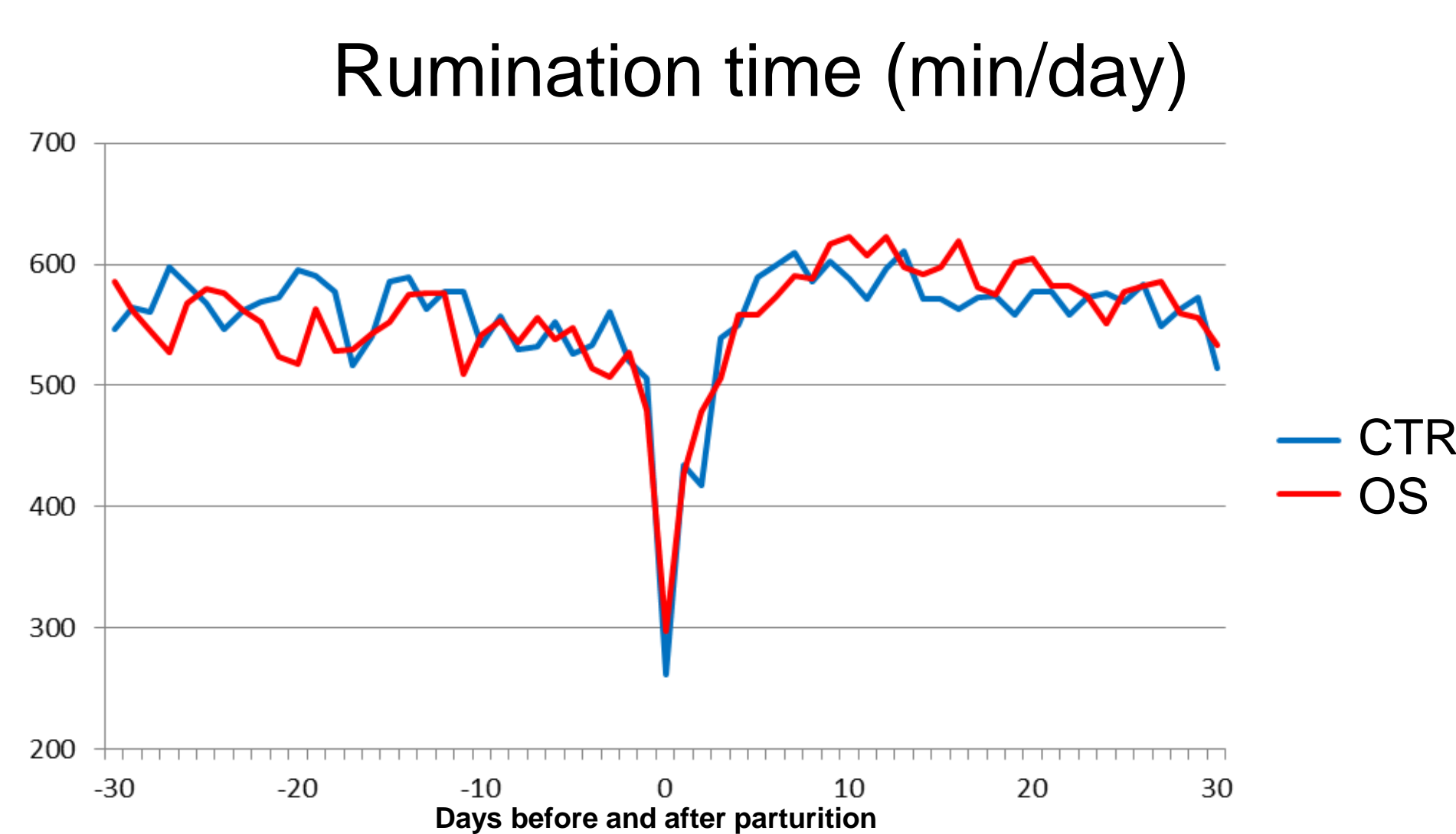
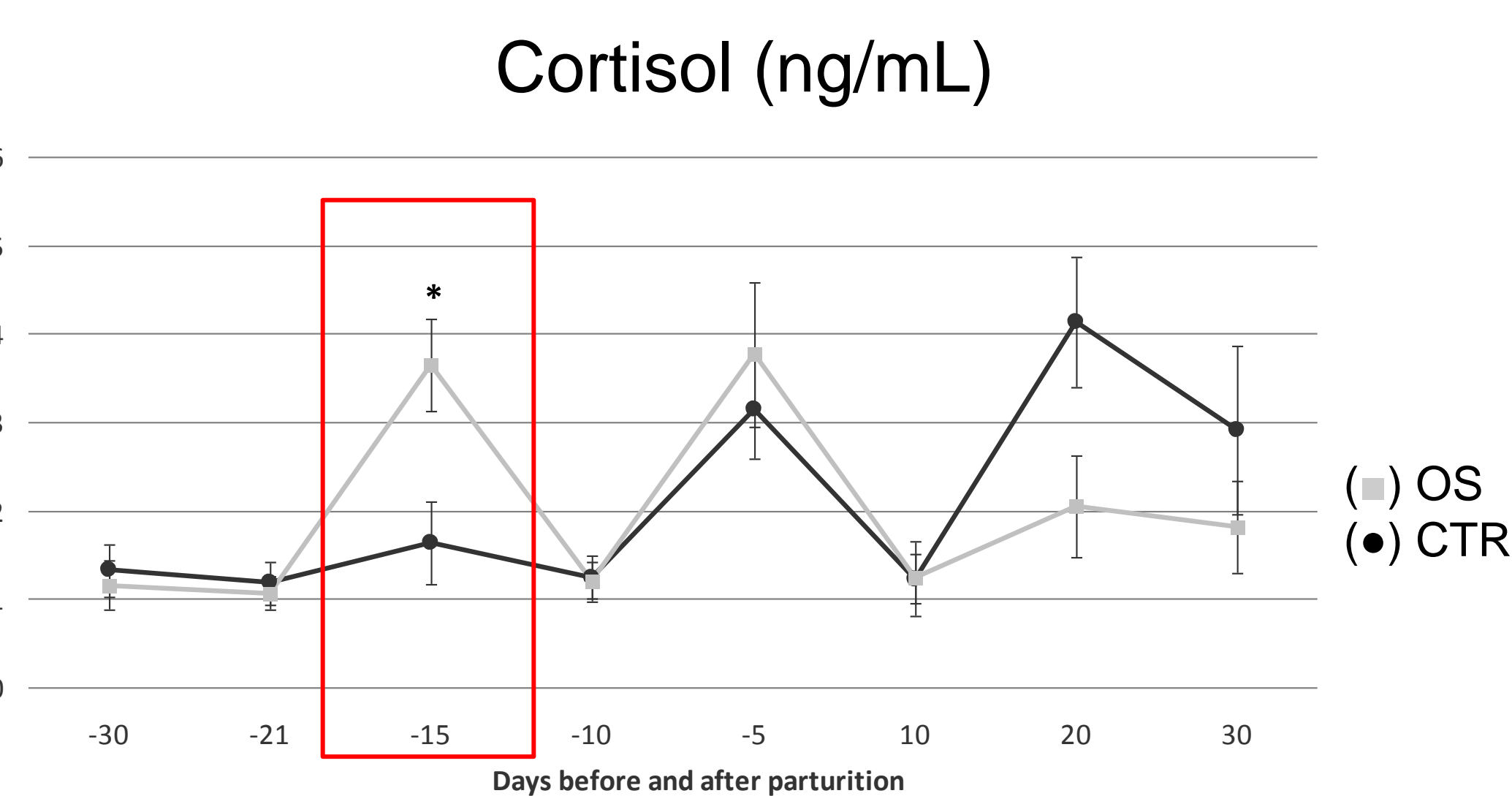


Experimental Methods

- Twenty-eight Holstein dairy cows were randomly divided into two groups (14 animals each), balanced for number of lactations, BCS (body condition score) and expected date of calving.
- Control group (CTR) had two animals per pen with 12.0 m² each, while the overstocked condition (OS) had three interference animals in the same pen with 4,8 m² for each animal.
- The experiment had a randomized switch-back design with pen as the experimental unit. Seven replicates were used, six of them had a nulliparous and a parous cows together and one replicate had only parous cows.
- On days -30±3, -21±3, -15±3, -10±3, -5±3 before and 10, 20, 30 days after calving blood samples were collected for the determination of plasma DHEA and C concentrations. Rumination time, activity (steps/h), lying time (min), and lying bouts were measured daily.
- Milk production and fat, protein and lactose concentrations were recorded daily. All the disease events were also recorded.

Results

- In both groups, there was an increase in DHEA before calving while after parturition the concentration declined rapidly.
- Overstocking significantly ($P < 0.05$) increased DHEA concentration compared to CTR group on day -10 (1.79±0.09 vs 1.24±0.14 pmol/ml) while an increase of C was observed ($P < 0.05$) on day -15 (3.64±0.52 vs 1.64±0.46 ng/ml).
- There were no differences between treatments regarding rumination times (total minutes of rumination/day).
- OS group showed significantly higher activity (step/hour), compared with CTR group.
- Total minutes of lying time per day was not different among OS and CTR groups. Daily lying bouts tended to be higher for OS group compared with CTR group in the first week of treatment.
- In the following weeks before calving no difference was recorded among groups. Milk production and quality were not different among treatments



Conclusions

Overstocking significantly increased DHEA concentrations compared the control group ten days before calving and five days following a significant increase in plasma cortisol. Moreover, overstocked group was more active, as measured by counting steps per hour, thus indicating restlessness in the pen.

Acknowledgments

This work was supported by a MIUR-COFIN grant (prot. 2010YBP4LZ_003).