

# Effect of pulsed alternating wavelengths on melatonin, cortisol, and serotonin concentrations in Holstein heifers

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## INTRODUCTION

- Manipulating light exposure at strategic points in the life cycle of cattle could be a non-invasive technique to improve performance, health, and well-being
- Pulsed Alternating Wavelengths System (**PAWS; Xiant Technologies, CO**) is a recently developed technology based on delivering specific light wavelengths and patterns

## OBJECTIVE

The objective of this small scale study was to compare the hormonal (melatonin and cortisol) and neurotransmitter (serotonin) levels in PAWS exposed vs. unexposed control calves.

## MATERIAL & METHODS

### Study Population:

Holstein heifer calves (3 d old) were housed individually in polyethylene hutches with a front yard of 2.25 m<sup>2</sup> with sand bedding (**Fig. 1**).

### Procedures:

#### Group allocation and treatment:

- Calves were assigned into 1 of 2 treatments: (1) control (CON; n = 4); and (2) PAWS exposed (PAWS; n = 4)
- Hutches in the PAWS group had interior lamps affixed to the hutch roof and were constantly on. All the study calves had free access to the enclosed front yard

#### Treatment evaluation:

- Blood samples were collected for determination of serum melatonin and serotonin concentration at 0600 h, 1200 h, 1800 h, and 2400 h on d 0 (enrollment), d 2, d 4, and d 14
- Hair was sampled for cortisol determination on d 0, d 14, d 40, and d 60

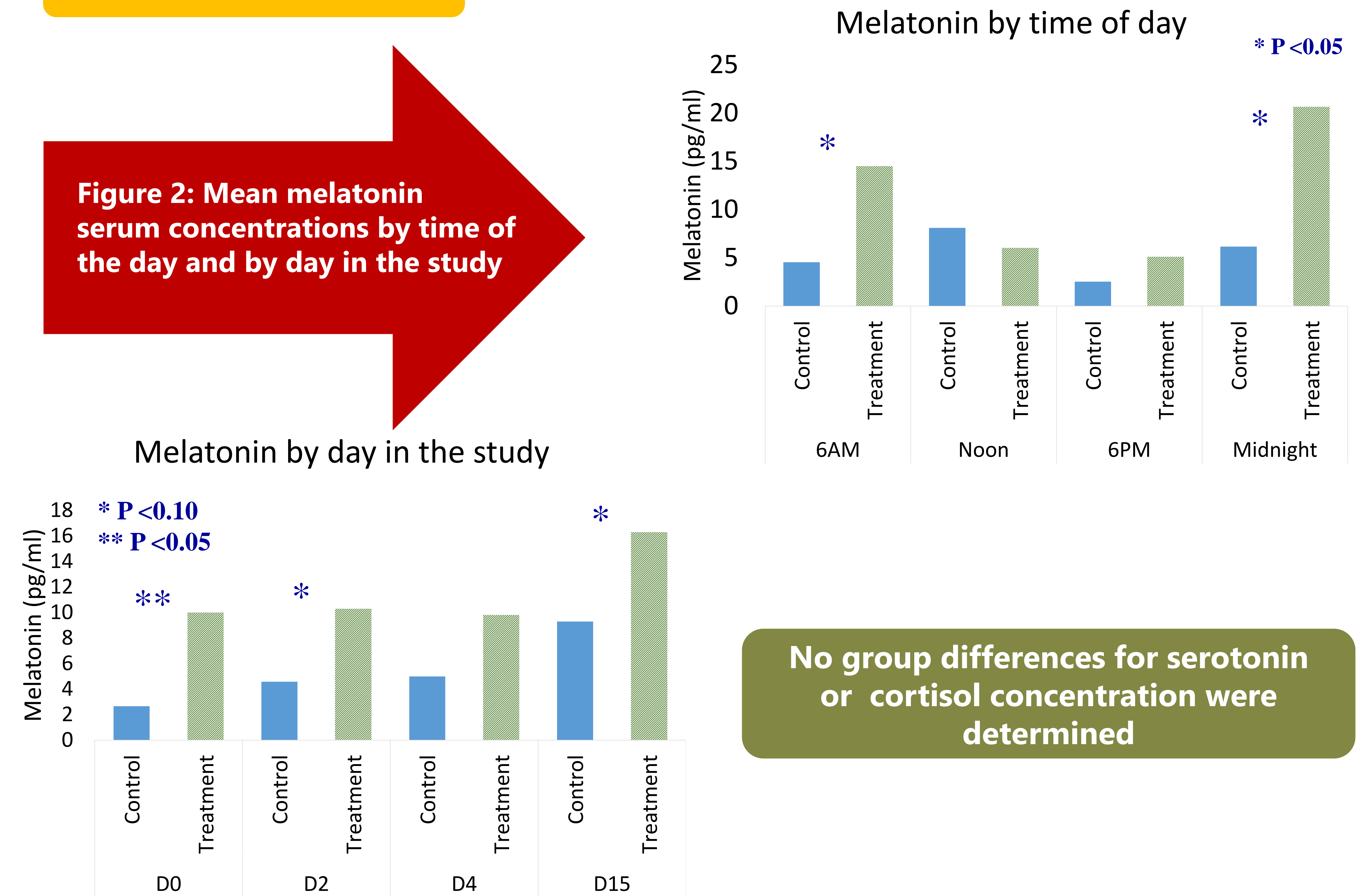
**Statistical analysis:** Treatment effect was evaluated by ANOVA and by repeated measures analyses by time of the day and by day in the study



Figure 1: Study setting including 4 hutches per treatment (left and center). Treatment calf exposed to PAWS during the night (right).

## RESULTS

Figure 2: Mean melatonin serum concentrations by time of the day and by day in the study



No group differences for serotonin or cortisol concentration were determined

Table 1: Mean (SE) melatonin and serotonin serum concentrations for the overall monitoring period

	CON	PAWS	P-value
Melatonin (pg/ml)	5.47 ± 1.9	11.6 ± 1.9	0.02
Serotonin (pg/ml)	1,644 ± 91	1,462 ± 91	0.16

## CONCLUSION

Data from this initial small-scale study indicate a significant effect for PAWS on serum melatonin concentrations. A larger study is needed to further explore these associations.