A new method of monitoring body temperature in horses with a microchip ®

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Introduction

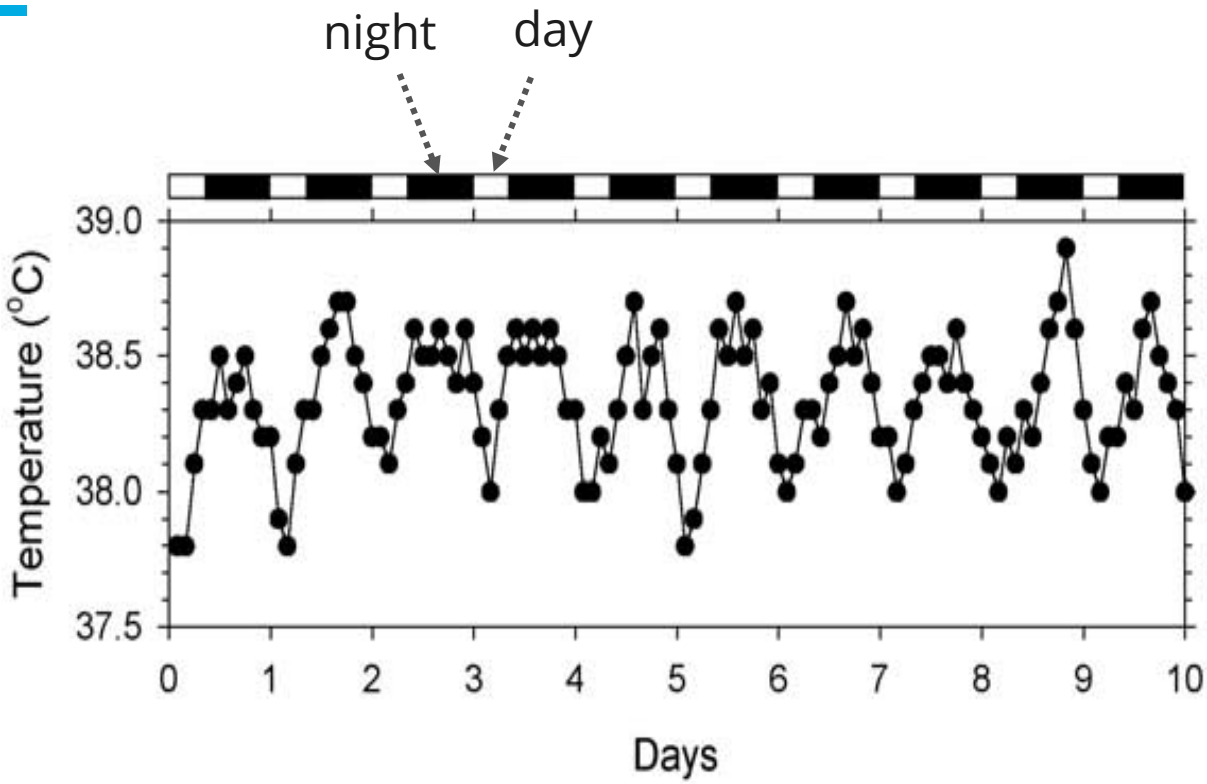
1. Temperature = indicator of health
2. Rectal temperature = usual method

➔ variations?

3. Horse = homeotherm
4. Temperature regulation

Introduction

Circadian rhythm



(Piccione *et al.*, 2002), rectal temperature

10 adult female horses, fed 4 times a day, individual stalls, natural winter photoperiod, ambient temperature 13 ± 1°C

What do we know about temperature regulation in equidae?

Feeding episods no detectable effect

Piccione *et al.*, 2002 : *rectal T°C of adult female horses, fed 4 times a day*

No environmental temperature effect (5 → 30°C)

Cross *et al.*, 1991 : *radio transmitter in the flank of mares*

Temperature rise during exercise

Piccione *et al.*, 2004; Smith *et al.*, 2006

Different temperature depending on anatomical areas : Telemetry-based gastrointestinal temperature = Rectal temperature +0,5°C & Blood temperature +1°C

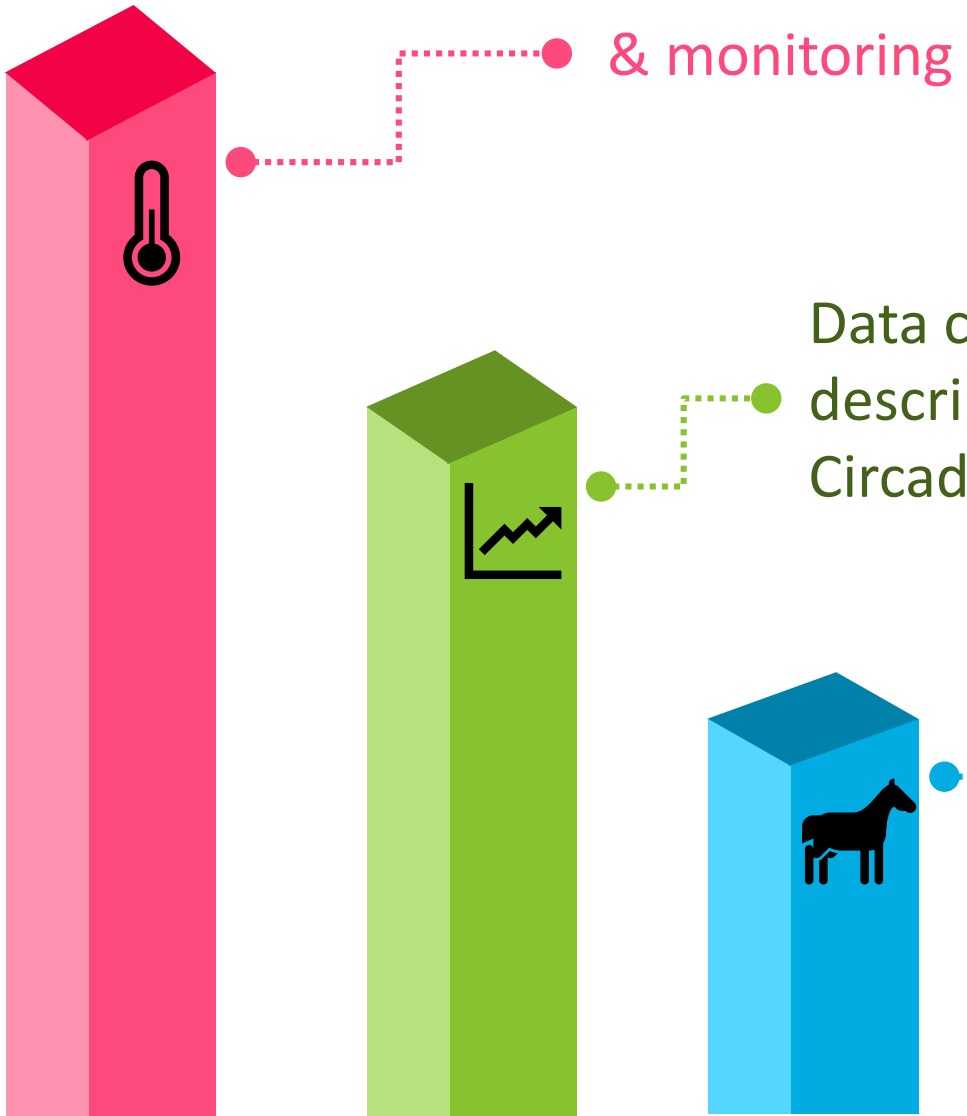
Green *et al.*, 2005 : *mature geldings*

Aims of the study

Test a new body temperature measurement & monitoring method without manipulation : microchip

Data collected ≈ physiological ranges describing in the literature & Circadian rhythm

Individual variations and what factors have some effect on body temperature

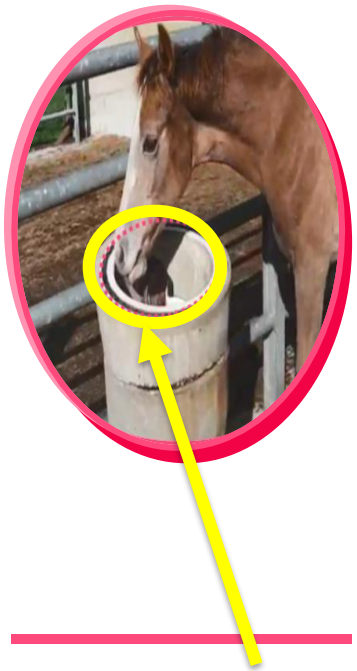


Material & Methods

Microchip®
Allflex 23mm

Identification & temperature sensor

Implanted in the neckline



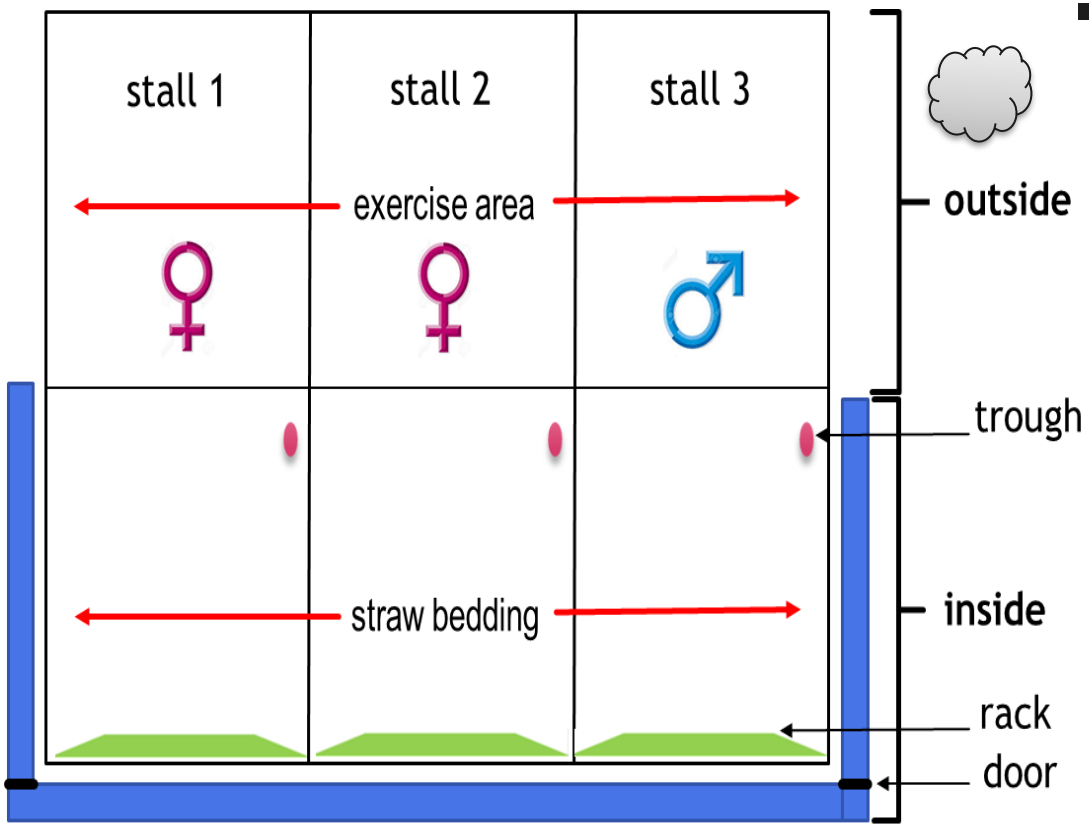
Cipam® Antenna in trough

Analysis

Mixed model

R Software

Material & Methods



Animals

- 43 warmblood foals
- 6 to 12 months
- 26 females & 17 males
- 2 generations (18 foals in year 1 and 25 foals in year 2)

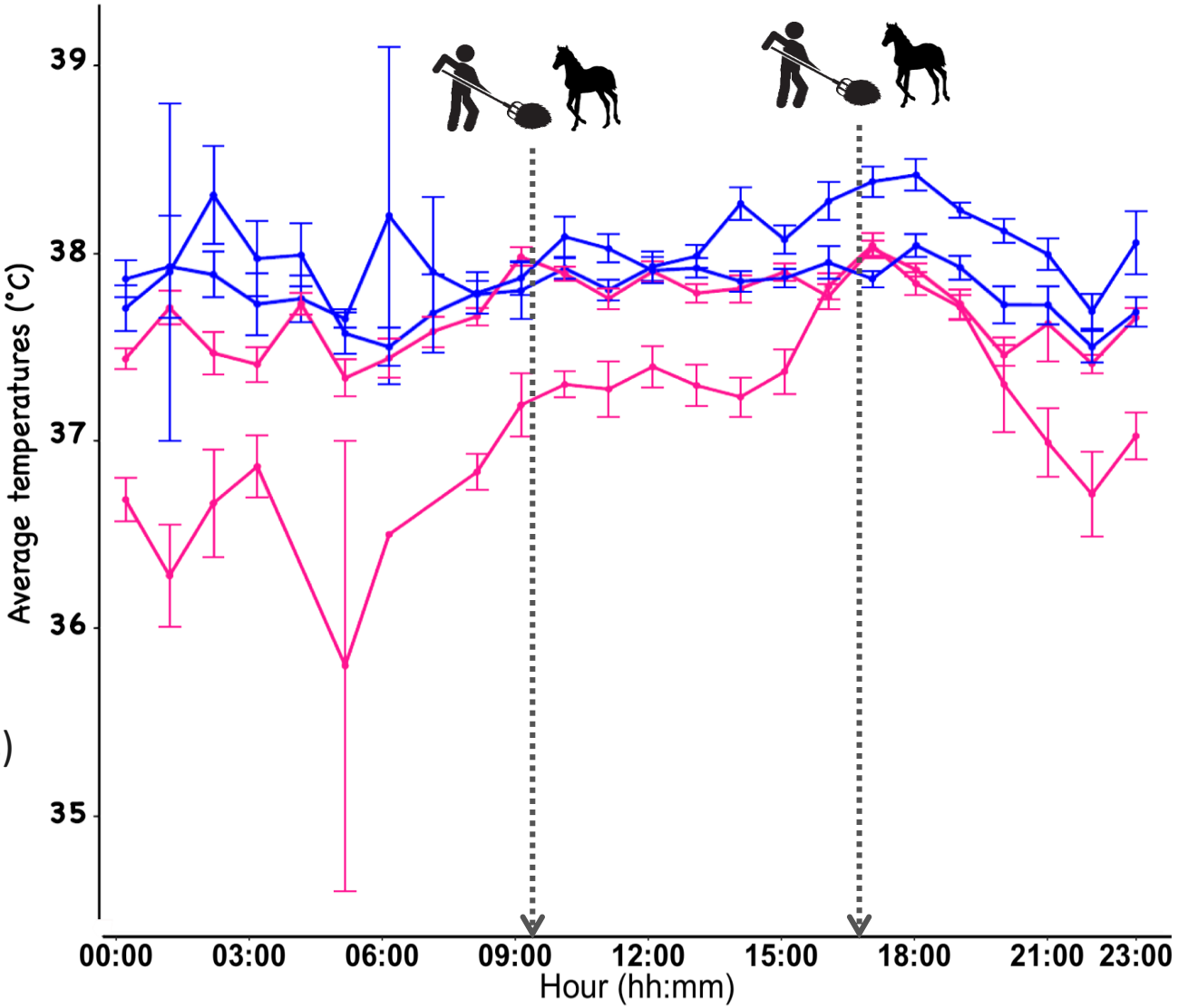
Conditions

- December to February, natural photoperiod
- Food (concentrated feed and forage, INRA requirements) at ≈ 8:30 a.m and ≈ 4:30 p.m
- Free access to water
- Weighed monthly

Results

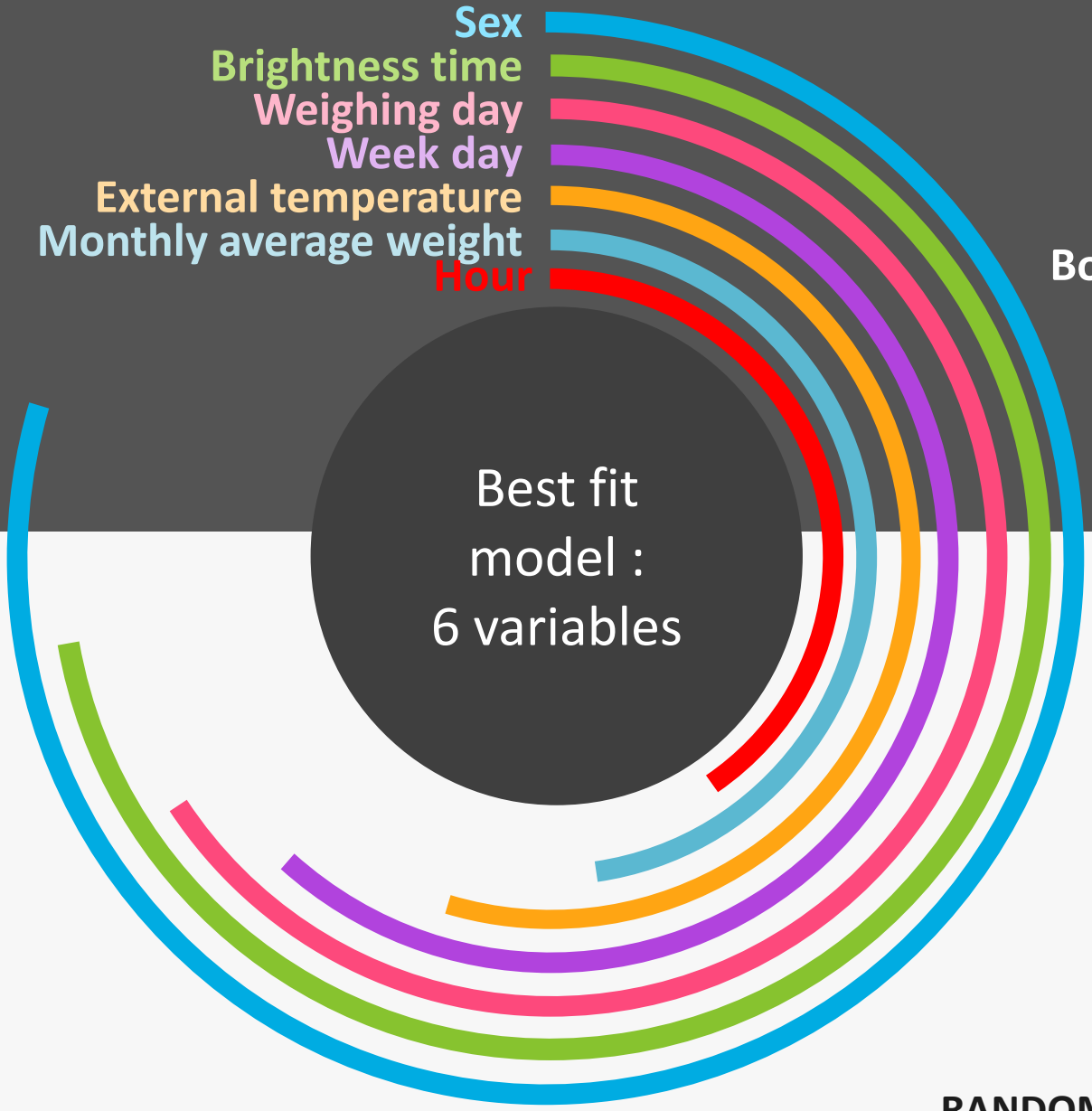
INDIVIDUAL

PROFILE



4 horses
(2 females and 2 males)

Modelisation



Body temperature ~ lme (fixed effects, random effect)

FIXED EFFECTS =

- Hours
- Mean body weight
- External temperature
- Week day
- Weighing day
- Brightness time
- Sex

RANDOM EFFECT = Horse

Results

SEX EFFECT

M 4:30 – 5:00 PM & 12:00 PM

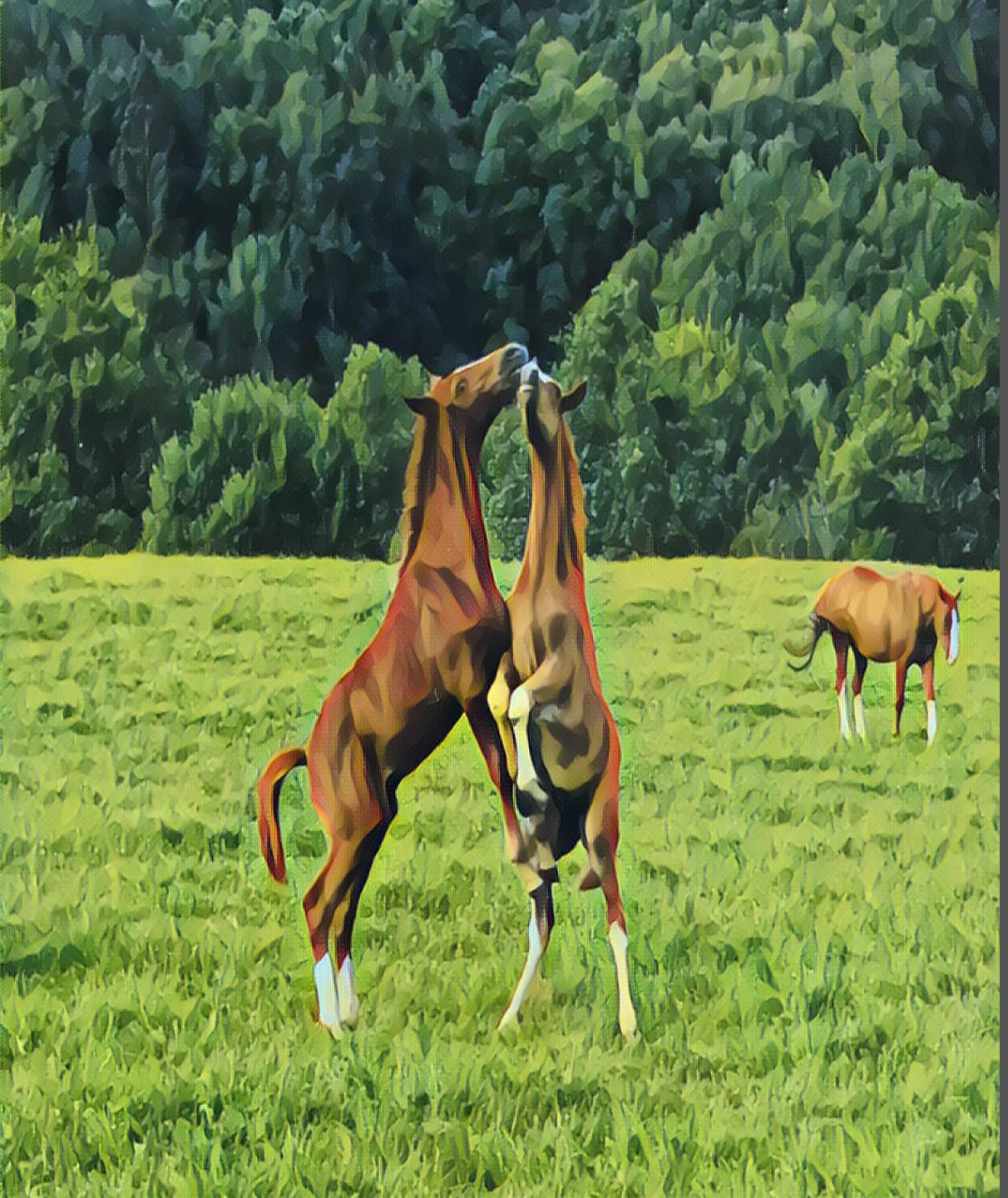
Why the males have higher temperatures?

Range T°C

37,03°C – 37,65°C ♀

37,35°C – 37,98°C ♂

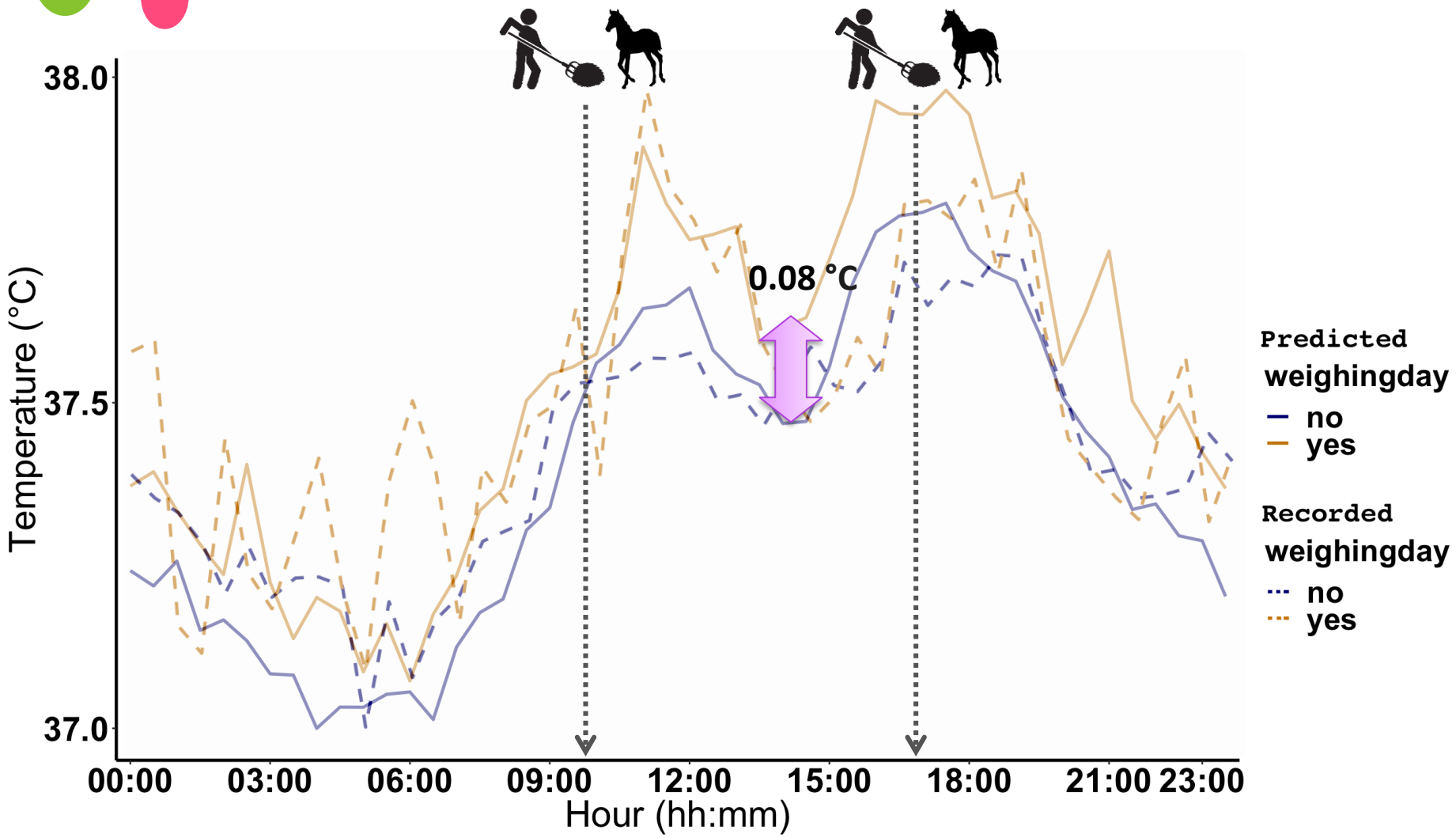
N.B: Stalls no effects
Sex was confounded with stalls



Hypothesis : Males more active than females

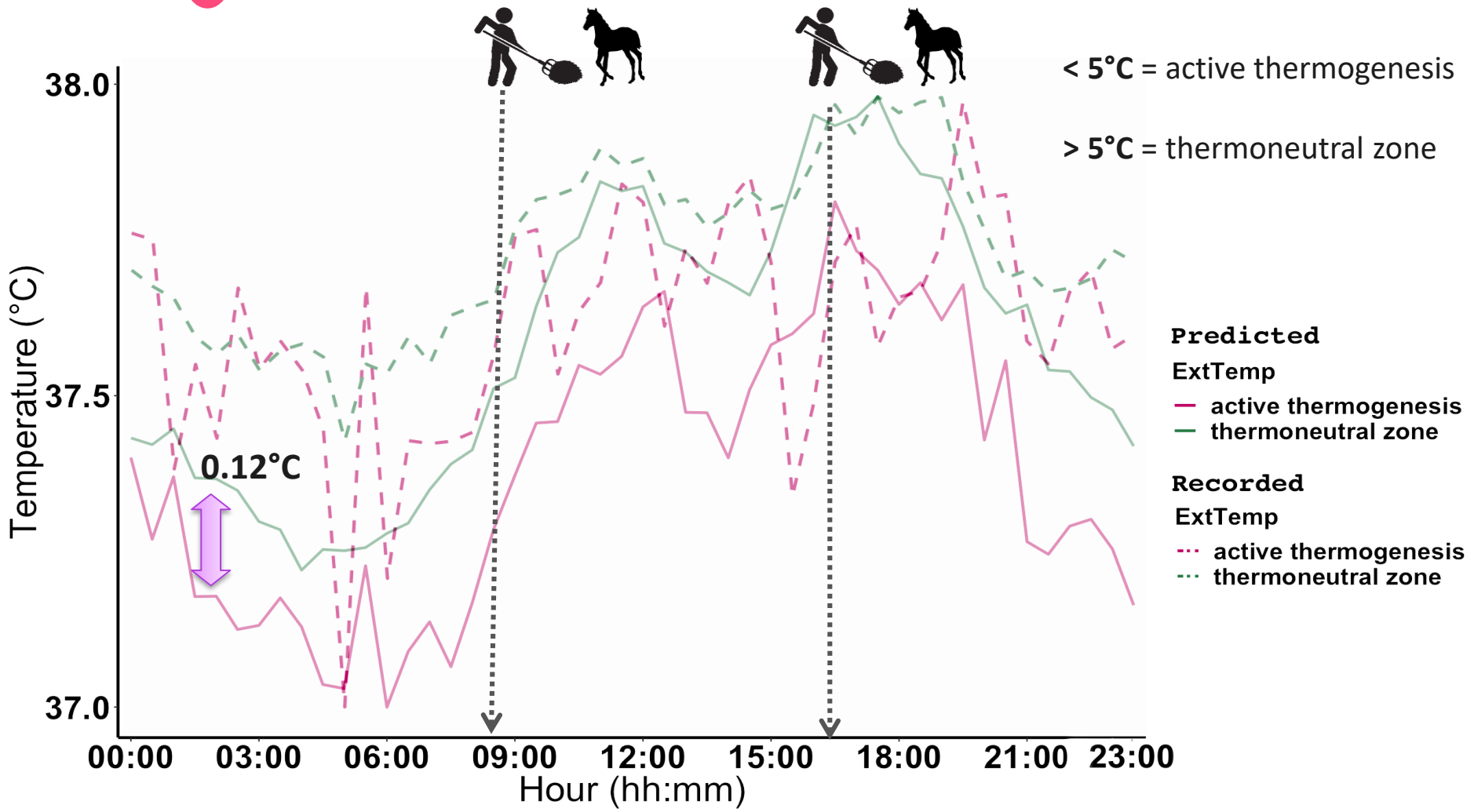
Results

WEIGHING DAY EFFECT ➔ activity induced



Results

EXTERNAL TEMPERATURE



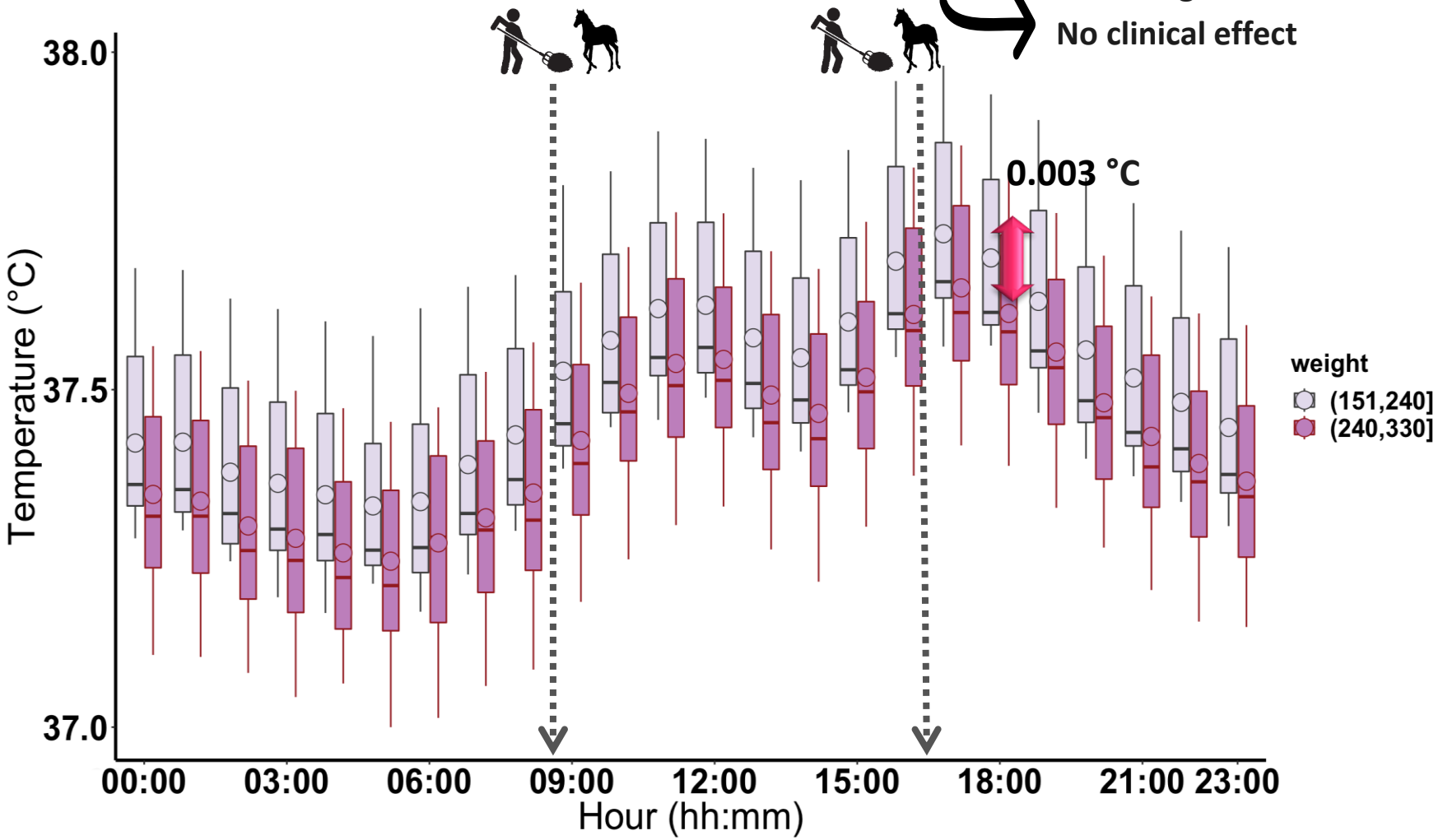
Results

WEEKDAY EFFECT & BRIGHTNESS TIME EFFECT & BODY WEIGHT EFFECT

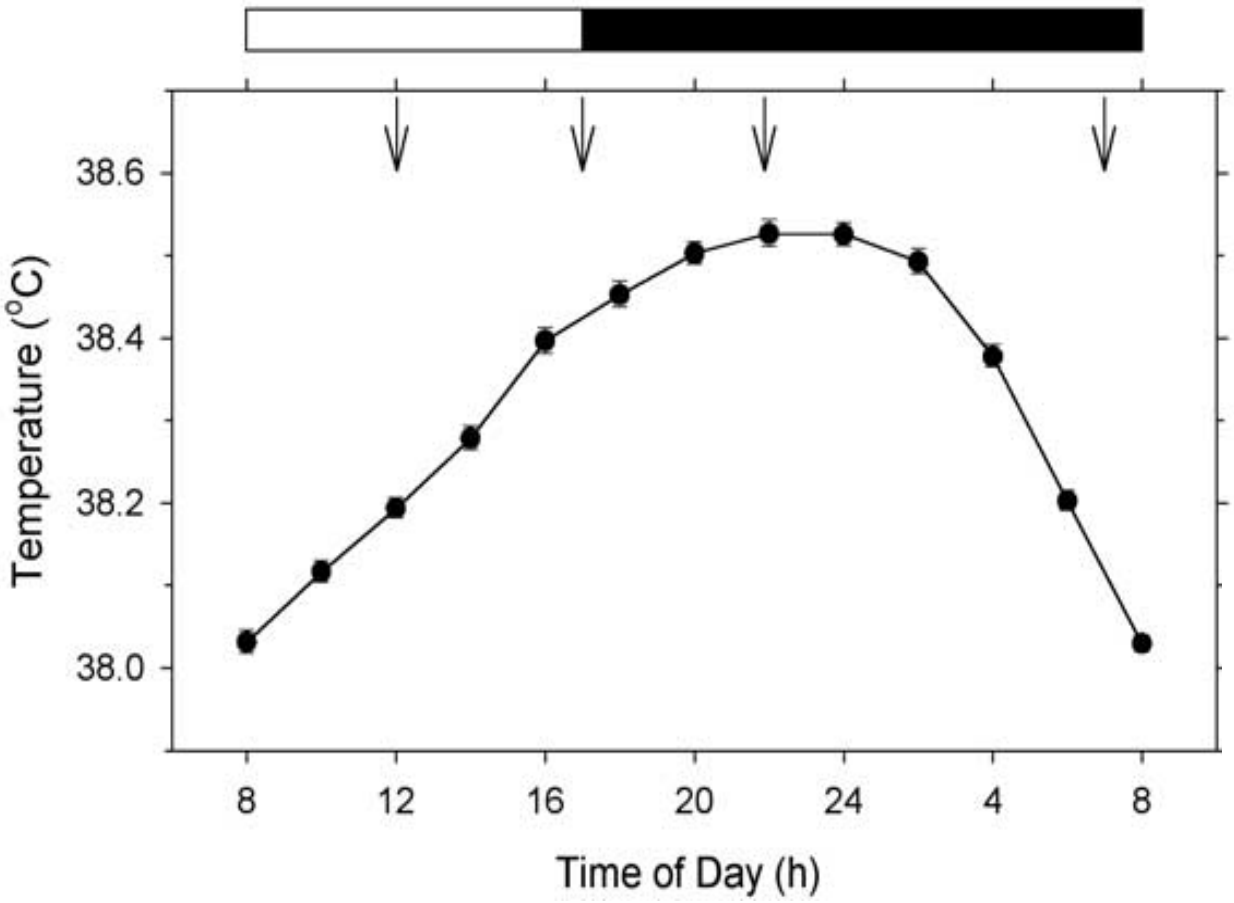
Example: average body weight

Very small difference between the categories of each variable

No clinical effect



Conclusion



Hours effect

- Circadian rhythm
-Acrophase different compared with literature
-Relationship with feeding?

(Piccione *et al.*, 2002)

Acknowledgement

Partner & Projet funder

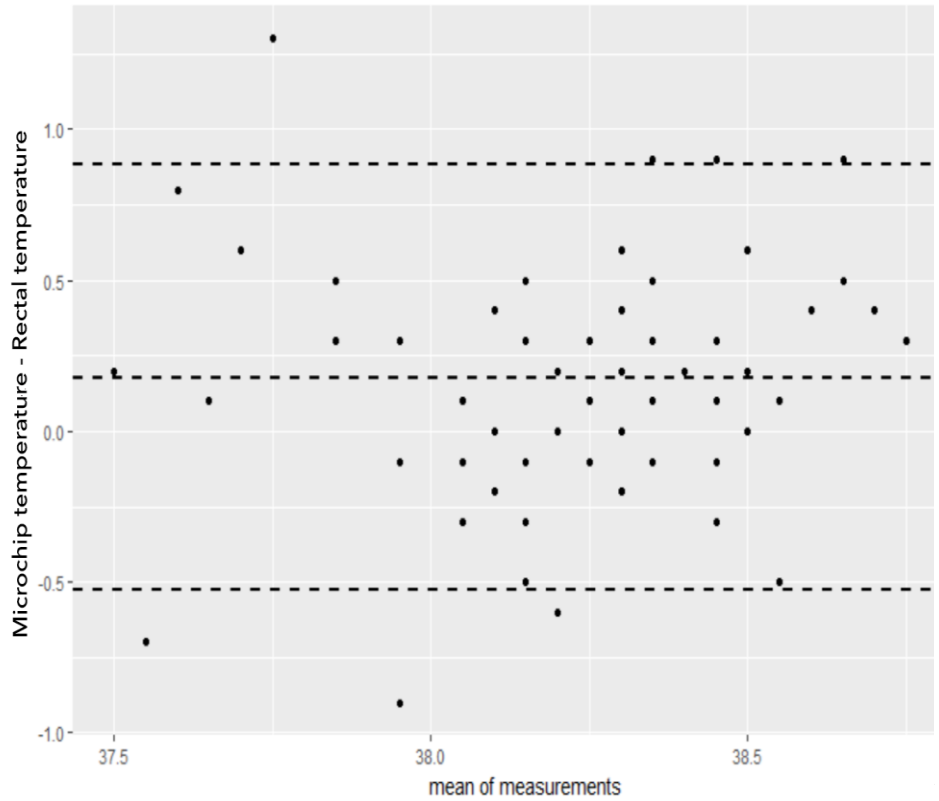
Thank You for Listening!

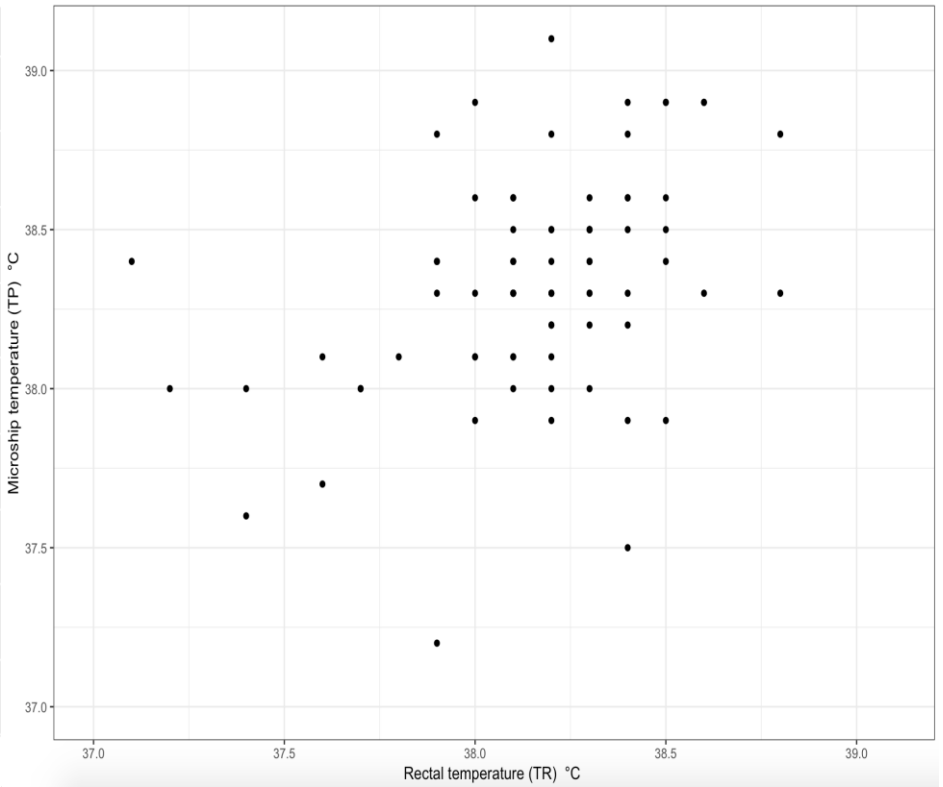
Any Questions?

Results

MICROCHIP TEMPERATURE & RECTAL TEMPERATURE

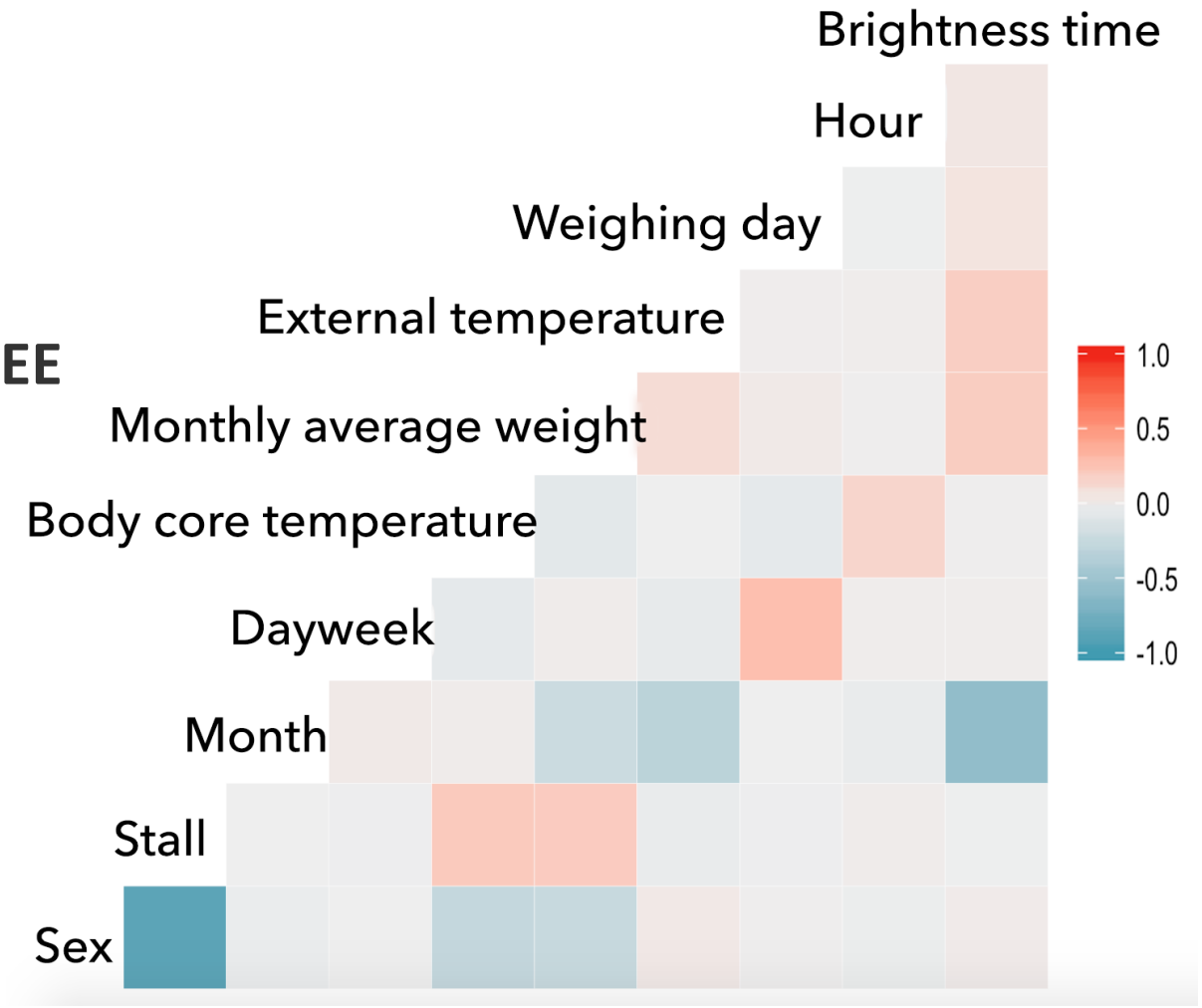
Bland Altman test





Results

CORRELATION TREE



Results

PREGNANT MARES TEMPERATURE