

# SALIVARY OXYTOCIN AND EYE CARUNCLE TEMPERATURE AS INDICATORS OF ANTICIPATION IN GROWING PIGS

Guilherme A. Franchi (Aarhus University)

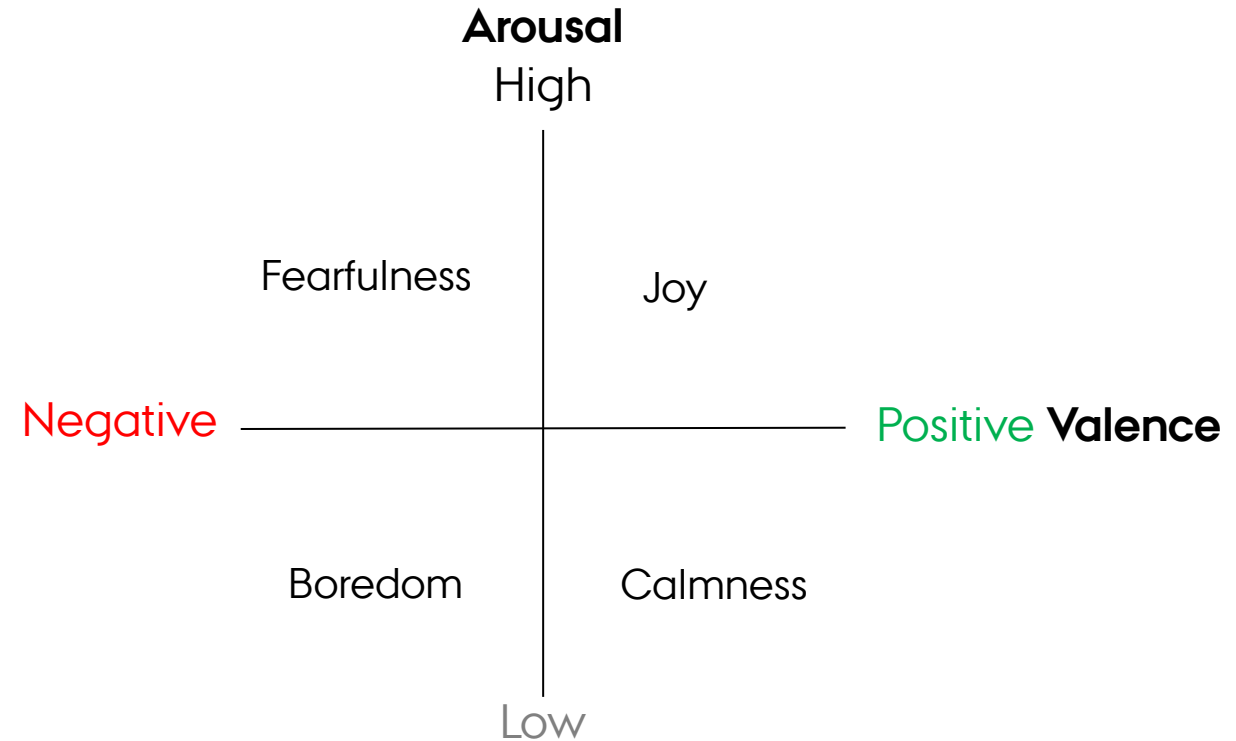
Liza R. Moscovice (Research Institute for Farm Animal Biology)

Helena Telkänranta (Arador Innovations)

Lene Juul Pedersen (Aarhus University)

# Conventional pigs and affective states

- Conventional production systems often do not meet pigs' basic behavioural needs
- Need for promotion of positive experiences → positive welfare
- Affective states and coordinated changes in behaviour, physiology, and cognition



*Lawrence et al., 2018; Mendl et al., 2010; Murphy et al., 2014*

# Anticipation and affective state investigation

---

- Anticipation: a response to a context or stimulus based on expectations about the future
- Classical conditioning → learn to anticipate **reward** or **punishment**
- Anticipation may reflect affective state and perception of stimulus
  
- Previous studies investigated pigs' anticipatory responses to e.g., pen enrichment materials, socialisation, and human contact
  
- However:
  - Measures varied
  - Typically used measures (e.g., locomotion, vocalisations) are valence-unspecific

*Antle and Silver, 2009; Dudink et al., 2006; Reimert et al., 2013; Spruijt et al., 2001; Villain et al., 2020*

# Objective

---

Explore the potential of salivary oxytocin (sOXT) and body temperature measured with infrared thermography (IRT) as measures of anticipation and valuing of fresh straw in conventional growing pigs

- Oxytocin: regulation of social relationships (Rault et al., 2017; Ross et al., 2009)
- Variations in affective state → alter sympathetic nervous system activity → changes in blood circulation from peripheral to core body regions → changes in body surface temperature (George et al., 2014; Travain and Valsecchi, 2021)

# Experimental pigs and conditioning period

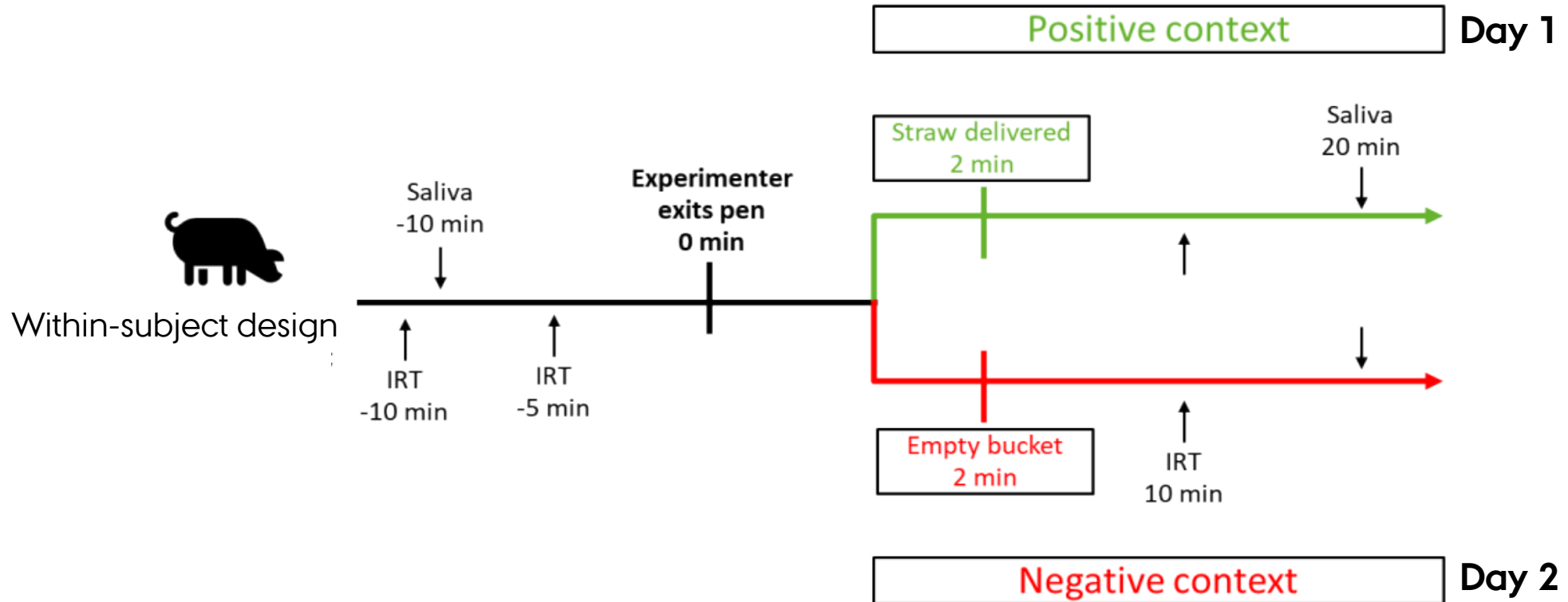
- 32 Yorkshire × Landrace growing pigs (8 castrated males, 24 females; BW:  $81 \pm 7$  kg/pig)
- 4 pigs/pen (3.28 m<sup>2</sup>/pig)
- 12-day conditioning to fresh straw delivery (200 g/pig)



2 min following  
exit from the pen



# Anticipation and violation of anticipation



- Footage-based behavioural sampling from -30 to +30 min (N=32):
  - Continuously: play behaviour (locomotor, social, object), tail motion (wagging or circling; static)
  - 1-min instantaneously: tail posture (high; not high) and tail tip lateralisation (right; left; centered)

# sOXT and IRT sampling (N=20 females)

SalivaBio® Infant Swabs (Salimetrics, CA, USA)



Credit: Liza R. Moscovice



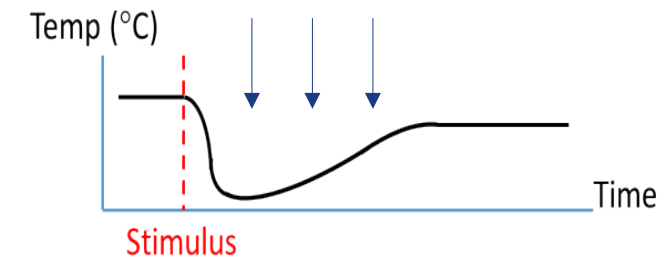
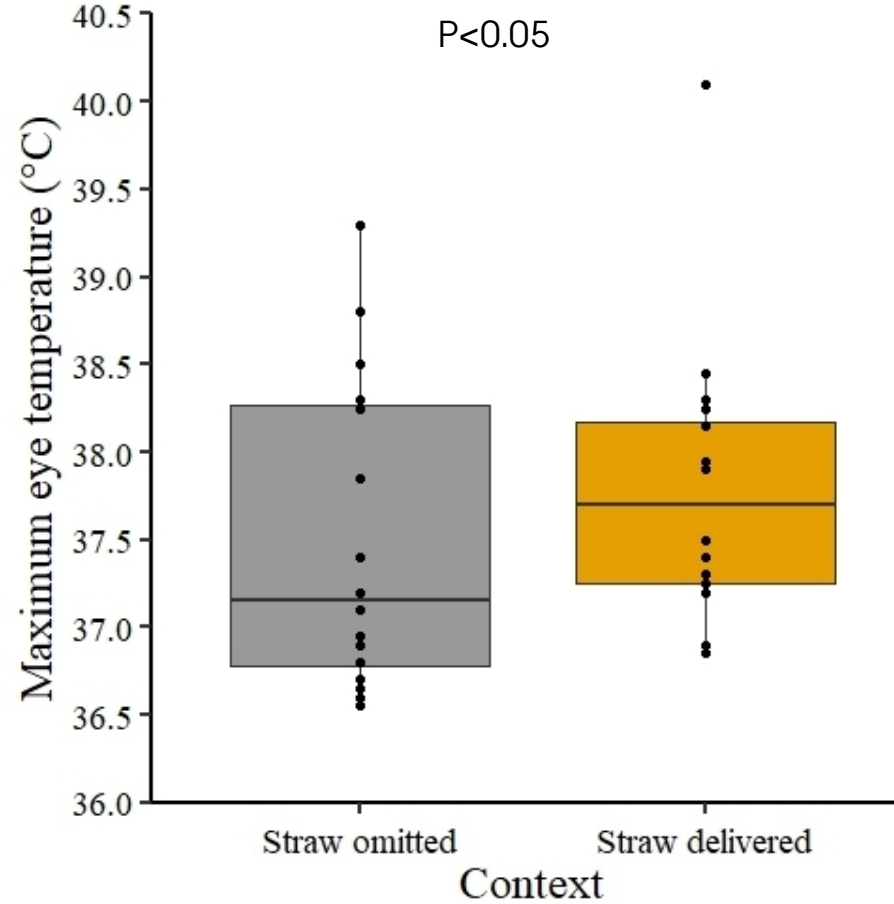
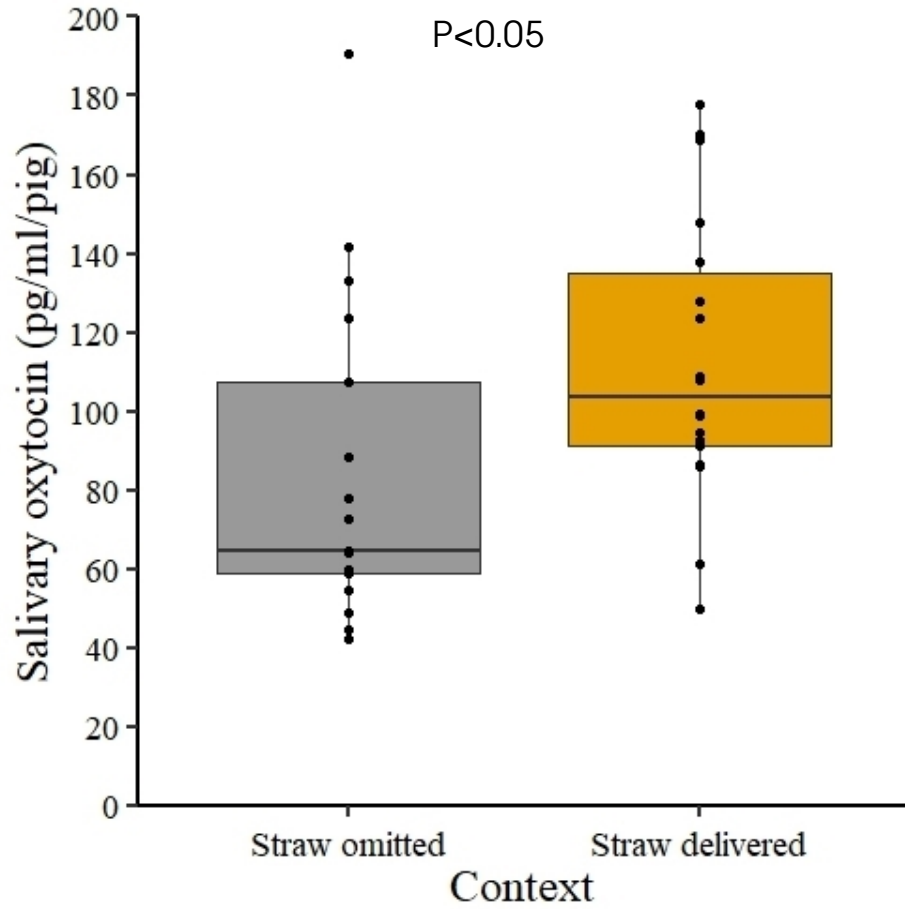
- FLIR
- FLIR
- Body region: **lachrymal caruncle of each eye**

# Statistical analyses

---

- GLMMs at pig level in R software v.4.2.2
- Explanatory variables:
  - Context (fulfilment of anticipation; violation of anticipation)
  - Sex (female; castrated male) \*only for behavioural measures
  - Body posture (standing; not standing) \*only for sOXT and eye temperature
- Covariate: respective outcomes during pre-stimulus period (baseline)
- Random effect: pig nested in pen

# Physiological responses

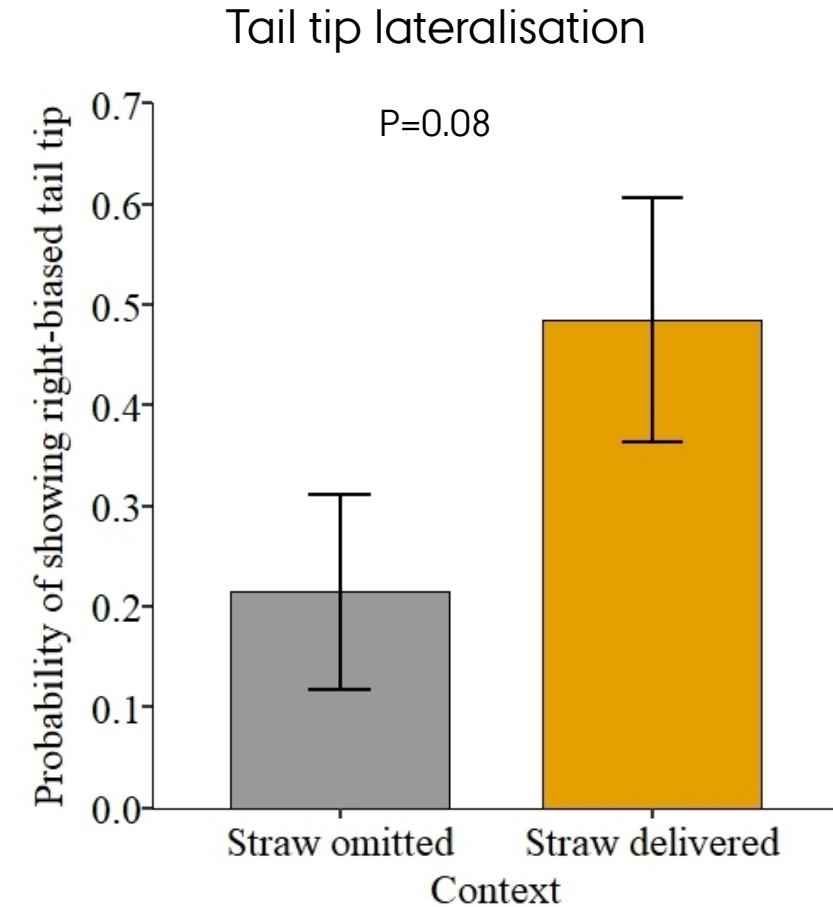
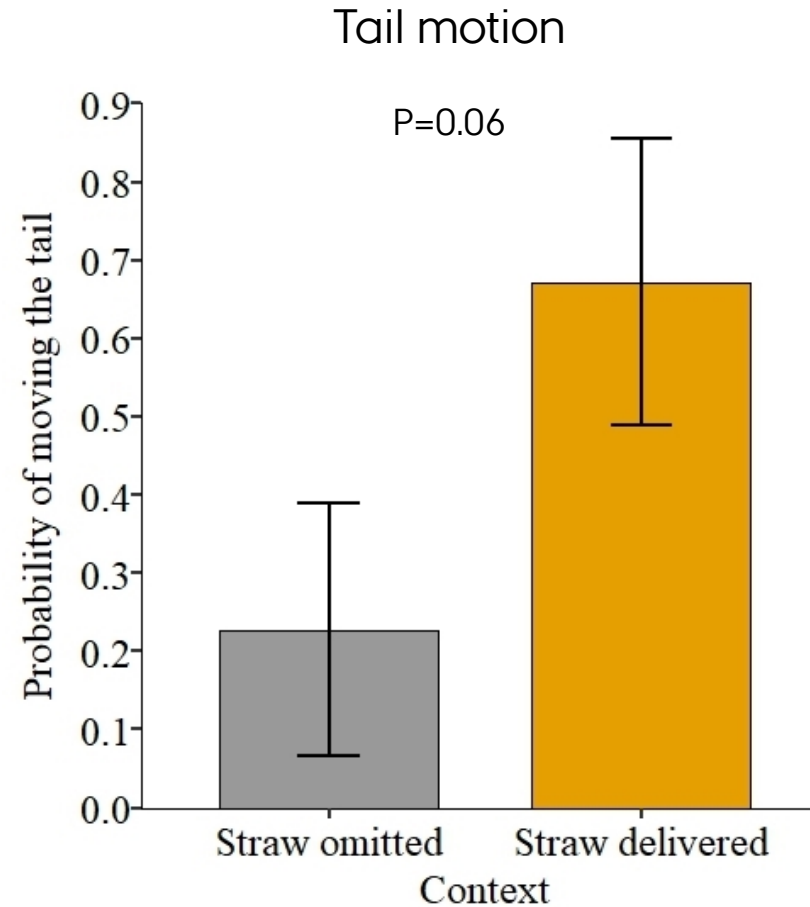


# Behavioural responses

When expectation for straw was fulfilled:

↑Object play ( $P < 0.05$ )

↑Social play ( $P = 0.08$ )



- No effect of context on tail posture ( $P > 0.10$ )
- Pigs were inactive  $> 50\%$  of sampling period

# Take-home messages

---

- Clear physiological responses to anticipation and experiencing of fresh straw provision
- To a lesser extent, behavioural responses to environmental enrichment were also seen
- Potential for quick, non-invasive assessment of affective states in pigs
- Future studies examining affective states measures in domesticated animals:
  - Different contexts
  - Different development stages
  - More frequent sampling
  - Consistency in sampling moments relative to stimulus presentation



# Acknowledgements

Birthe Houbak, Dines Thøger Bolt, and Jeanet Winters (Aarhus University)  
Birgit Sobczak and Petra Müntzel (Research Institute for Farm Animal Biology)

The study was developed as part of the project **PIGWEB** funded by the European Union's Horizon 2020 research and innovation program under grant agreement No. 101004770

# Thank you!



AARHUS  
UNIVERSITY