University of Saskatchewan

Goal 2: Play behaviour and its role to enhance pig welfare and production

Giuliana Miguel-Pacheco, Luis Gracia Gonzalez, Yolande Seddon
Western College of Veterinary Medicine

NSERC IRC in Swine Welfare
Research Advisory Committee meeting
May 4th, 2021

BE WHAT THE WORLD NEEDS

University of Saskatchewan

Play Behaviour
Benefits for the Swine Industry

- ✓ Expressed in the absence of fitness threats
- ✓ Linked to **positive emotions** in animals
- ✓ Assessed non-invasively
- ✓ Easy to recognize
- ✓ Supports behaviour development
- ✓ Learn about the environment and respond effectively to challenges

As a tool:

- ✓ To assess welfare – pigs that play +welfare
- ✓ To detect at risk animals

Understanding promotion of play:

- ✓ Management tool to enhance welfare
- ✓ Enhance resilience & productivity

Canadians expect “natural” living conditions and promotion of positive affective states for farm animals (Spooner et al 2014, *Livestock Science,* 163, 150-158).

University of Saskatchewan

Play Behaviour in Pigs

- Highly playful animals
- Common in young adults
- Peak between 2 to 6 wks of age
- Affected by sex
  - Males exhibit higher play

Locomotor-rotation
Waving/tossing the head, scampering, jumping, hopping

Social play
Pig pushing or nodding, mounting or climbing, chasing another pig

University of Saskatchewan

Play Behaviour in Pigs

Object
Physical manipulation of inanimate objects

Play Behaviour Benefits

Pre-weaning play increases physical & emotional flexibility to deal with challenges

- Increases amounts of a key modulator of neural development and plasticity
- Increases levels of pleasure neurotransmitters (acetylcholine, glutamate, and opioids)
- Increases activity of brain areas related with reward

- ✓ Formation of dominance relationships more easily D'Eath et al 2005
- ✓ Aggression reduction post-weaning Weller et al 2019, Martin et al 2015
- ✓ Less fearful Martin et al 2015
- ✓ Positive emotional state, less fearful and more inclined to interact with strange person (play sessions with toys) (Marcet-Rius et al 2020)

Goal 2 Objectives

Identify whether the **promotion of play** can be used as a production tool to increase physiological and psychological robustness in pigs.

1) Identify how to support increased expression of, or to incentivize play, within the commercial production environment
   - During its natural window of development
   - Can play be extended: induced later in life

2) Determine the biological response of pigs to play, specifically:
   - Identifying the emotional response of pigs to play
   - The immune responsiveness of pigs raised with regular play stimulation.
   - Robustness measures
   - Influence on sociability

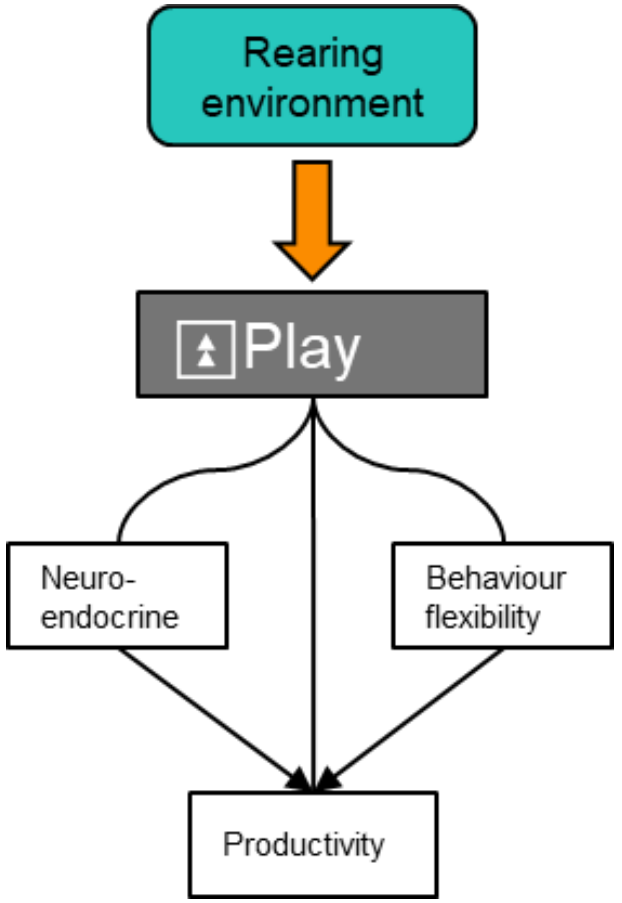
➢ Identify its use as a tool to confer fitness and resilience

Goal 2: Play Exp 1: Data collection ending April 2021

Objective: Explore **how to incentivize play** within the pre-weaning production environment during its **natural window of development** and determine the benefits to accrue.

Expected relationships

- *Manipulation of the rearing environment to enhance play opportunities will result in an **increase of play** behaviours.*
- *Increased play will:*
- *Increase behavioural flexibility*
  - *improving the speed of transition to weaning*
- *Result in quicker resolutions of social conflict*
  - *Lowering stress to social challenges*
    - *Reducing injury during conflict*
- *Improve productivity through modulating the coping response*
  - *Less partitioning of resources away from growth into the stress response*



The method of environmental manipulation will influence the response

Goal 2: Experiment 1

Promotion of play

- Determine if manipulation of the pre-weaning environment can influence the expression of play behaviour and the quantity of play behaviour.

Evaluate the relationship between:

Social skills & stress resilience

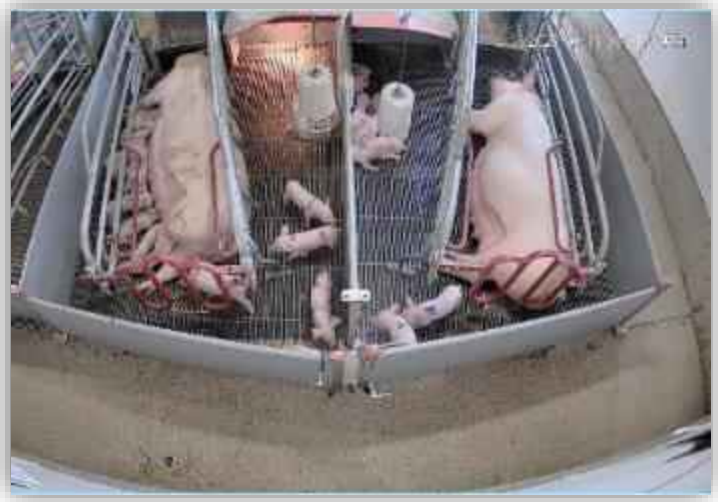
- Play and productivity.
- Training for the unexpected: weaning
- Play and social development
  - Quantify social skill development
  - Determine whether social skills reduce cost of aggression in commercial conditions

Exp. 1:Treatments: Promotion of play

Extra Space:

Increases the opportunity of piglets to perform <u>locomotor play</u>

- Piglets adapt better at weaning environment due to opportunities to explore and exercise.



Commingling

Increases social play as higher number of play partners and interaction with unknown individuals

- Piglets may have better social skills

Exp. 1: Treatments: Promotion of play

Straw

Test: Is a biological relevance important?

- Promotes play, but also can be explored and consume
- Piglets more eager to explore at weaning improving resilience

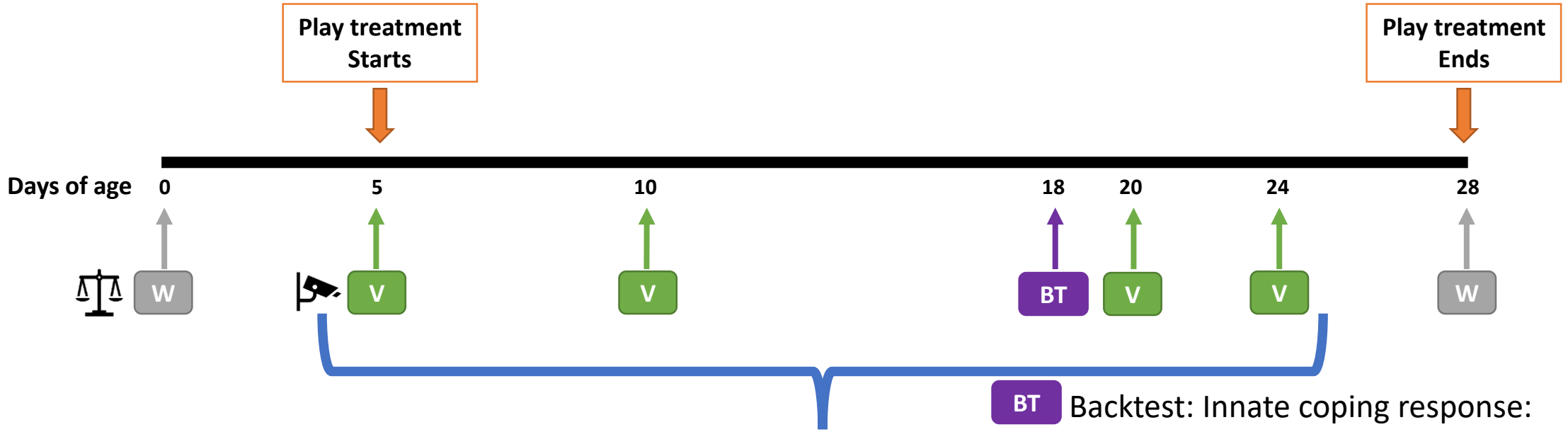
Toys: Novelty, but not biologically relevant

Reaction to novelty and opportunity to engage with items

- Object enrichment – influences social behaviour
- Piglets more eager to explore at weaning
  - may be not be as resilient as straw piglets – role for ingestive development

Experiment 1: Pre-weaning

- 50 litters: Over five farrowing batches - 10 sows / batch
- Standard crate compared against play treatments

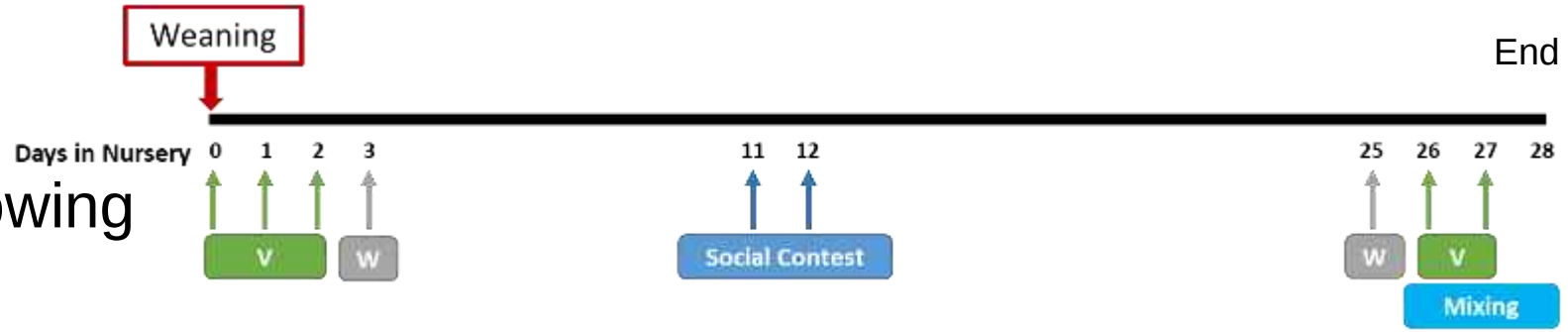


- Track the development of play in the litter
- Litter levels
  - Individual variability of play

Experiment 1: Nursery

Post-weaning:

Did play behaviour during farrowing prepare piglets for weaning?



- Behavioural changes indicative of stress

- Adaptation to new environment and weaning stress.
  - Latency to return to normal
  - Behaviour
  - Growth

Post-weaning: Social Contest

- Eighty pairs of pigs: Sixteen pairs/treatment

Did opportunities to play pre-weaning better equip piglets for social encounters?

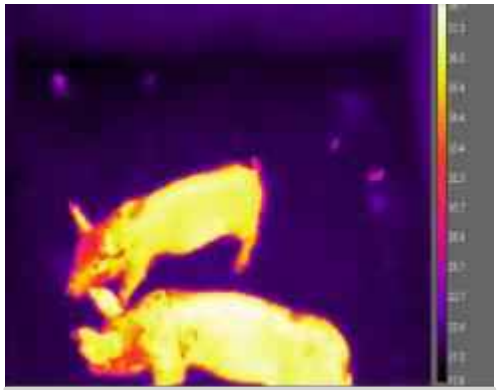
Assessment of the opponent: Proficiency in mutual assessment

Good assessment ⇨ lower cost fights: less injury, short duration.

Infrared Thermography (IRT) Social Contest

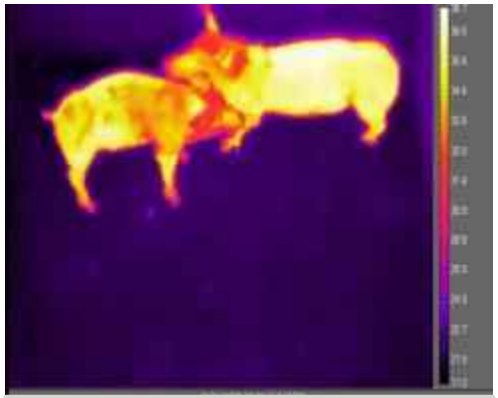
IRT imaging cameras: visualisation & quantification of skin temperature distribution

- To detect physiological & emotional response to agonistic encounter
  - Vasoconstriction

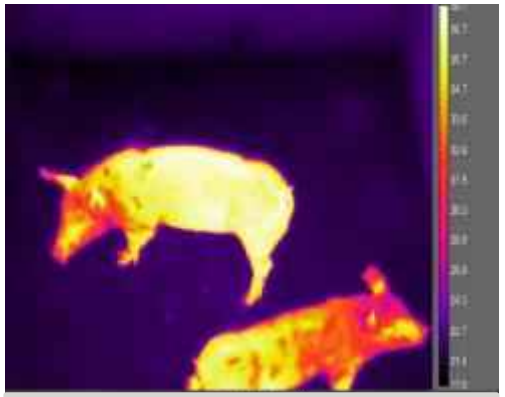


Pre-Fight

- Winners & losers behavioural changes influence IRT[1]
  - ➢ Social defeat: reduces temperature but increases after retreat
  - ➢ Bullying after fight: temperature reduction continuous



During



Post-Fight

Play behaviour and social skill development:

Able to influence the physiological and emotional response to an aggressive encounter?

Mixing in commercial farms: Negative effects of continued social defeat?

1 Boileau A, Farish M, Turner SP, Camerlink I. Infrared thermography of agonistic behaviour in pigs. Physiol Behav. 2019 Oct 15;210:112637. doi: 10.1016/j.physbeh.2019.112637. Epub 2019 Jul 30. PMID: 31374228.

End of Nursery Mixing

- Opportunities to play during farrowing:
  a) Support social skills
  b) Reduce aggressiveness

} Better conflict resolution?

Production mixing scenario

Expected date for conclusions: Experiment 1

- Delays from challenges worked through
- Data collection completed April 2021: Statistical analysis to select the most promising treatments:

	May	June	July	August
Productivity	✓			
Play behaviour pre-weaning	✓	✓		
Behaviour nursery			✓	
Behaviour at mixing			✓	
Social skills		✓	✓	
InfraRed data				✓

- **June 2021** – Preliminary results based on productivity, pre-weaning treatments, social skills
- **August 2021** – Final conclusions of experiment 1

Goal 2: Timeline

- **Summer 2021: Wrap up of data for exp. 1**

- **Summer 2021 Experiment 2:**

How to prolong play & to determine whether there is a positive emotional response from the pigs.

- **May 2022 Final experiment**:

Can play improve the immune response.

Karolina Steinerova

MSc in Animal Science - Swedish University of Agricultural Sciences

- Arrived in April 2021
- PhD student candidate

Goal 2 Overview

Experiment 1	Experiment 2	Experiment 3
➢ **How to promote play:** Manipulation of the pre-weaning environment ➢ Relationship between **play** and **productivity**.	➢ How to prolong play & to determine whether there is a **positive emotional** response from the pigs.	➢ Can play improve the **immune response.**

- ✓ Methods to trigger play in a production environment
- ✓ Consequences of play for welfare and production
- ✓ Methods develop for suitable adoption by industry

Layer information into Goal 1 studies: Long term impacts