# Enriching neonatal environment: a potential strategy to improve long-term performance in pigs

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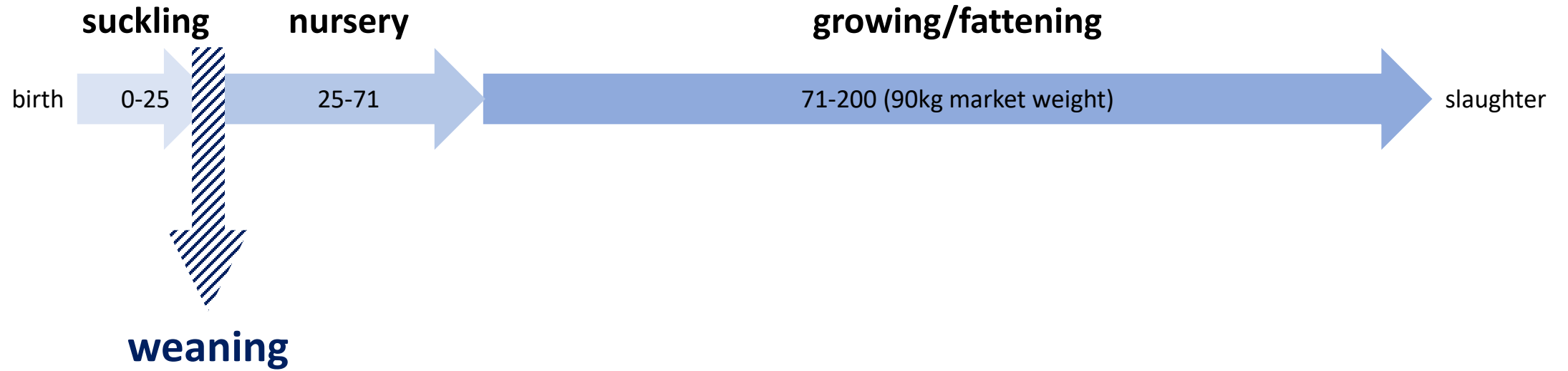
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# Outline

- Introduction
  - Abrupt weaning in commercial conditions
  - Play and social behaviors in piglets
- Materials and methods
- Results
- Welfare implication

# Pig Farming



suckling    nursery                    growing/fattening

birth    0-25    25-71        71-200 (90kg market weight)    slaughter

**weaning**

0.20 m²/animal                    0.62 m²/animal

Jensen and Recén, 1989; Petersen *et al.*, 1989

# Abrupt Weaning Challenges for Piglets

## Stressors

**Transportation**

**Handling**

Change in **environment**

Transition in **diet**
(liquid to solid)

Loss of **maternal and littermates' attachment**

**Mixing** with unfamiliar pigs
(establishment of hierarchy)



## Consequences

Vigorous fighting

Elevated level of stress-related hormones

Suppressed immune function

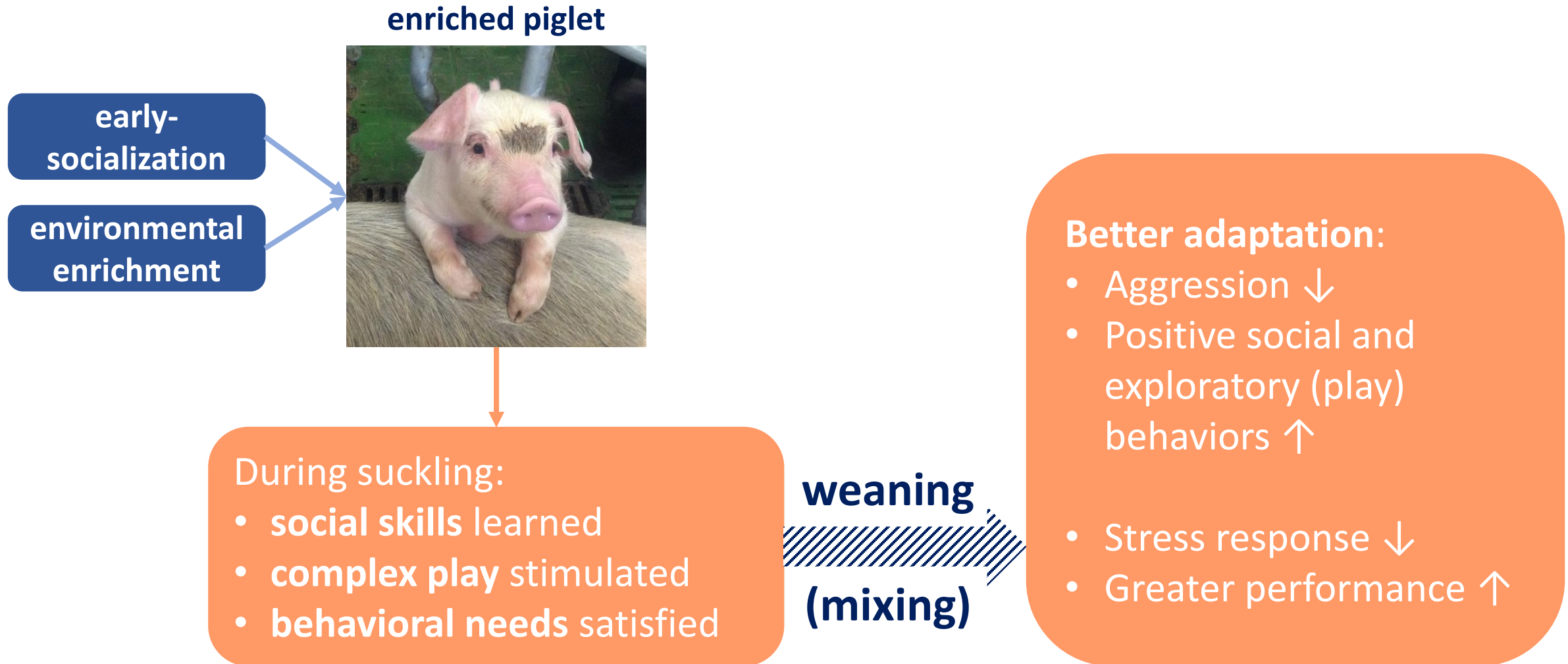Reduced weight loss

Increased mortality rate

# Play and Social Behaviors

- Locomotor play
  - Prepare for unexpected situations

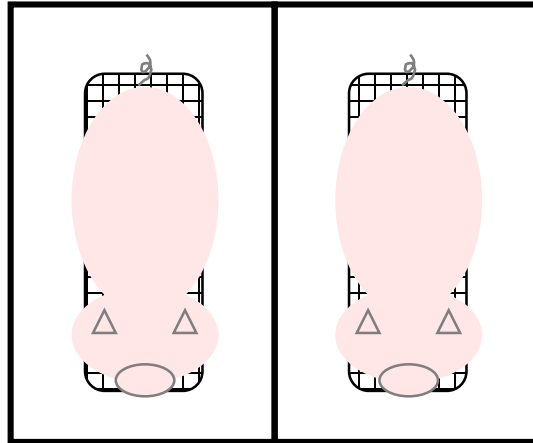- Social play
  - Develop necessary social skills

→ Cope with novel environment better and avoid excessive confrontations



Bekoff, 1984; Spînka *et al.*, 2001

# Aim and Hypothesis

**enriched piglet**



**early-socialization**

**environmental enrichment**

During suckling:
- **social skills** learned
- **complex play** stimulated
- **behavioral needs** satisfied

**weaning**

**(mixing)**

**Better adaptation**:
- Aggression ↓
- Positive social and exploratory (play) behaviors ↑
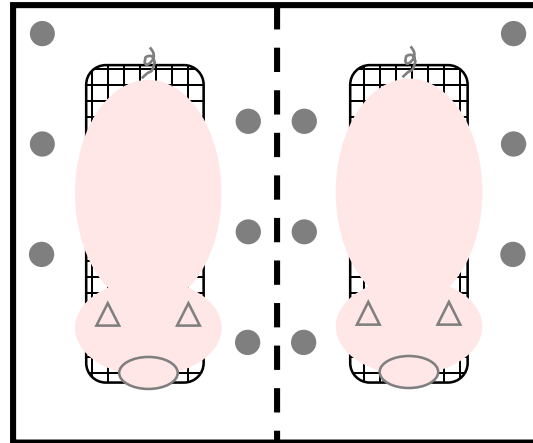
- Stress response ↓
- Greater performance ↑

# Experimental Design



**(a) CON**
without socialization
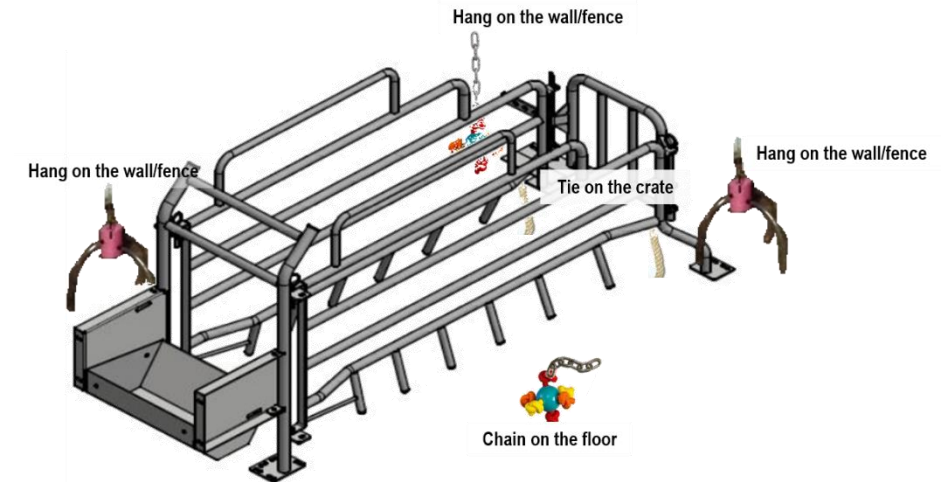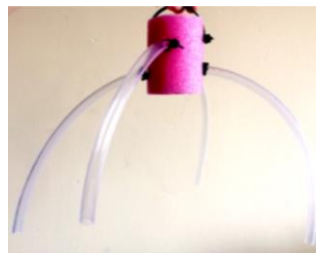barren environment during suckling

23 litters, 324 piglets
(10 primiparous + 13 multiparous)

**(b) ENR**
socialized 2 litters of piglets at 14 days of age
3 types of 6 enrichment objects

24 litters, 337 piglets
(10 primiparous + 14 multiparous)

# Set-Up

- Location
  - Lleida, Spain
- Period
  - June 2017 – January 2018
  - Birth to slaughter
- Large-scale intensive system
  - Breeding stock of 1,130 sows
  - 50 – 60 weekly farrowing sows

# Live Behavioral Observation

suckling          nursery                    growing/fattening

15, 22  29, 36

**CON**
**Total:** 23 litters
**Selection for Behavior:**
17 litters

**ENR**
**Total:** 24 litters
**Selection for Behavior:**
17 litters

**Ethogram**

| Item | Description |
|------|-------------|
| +S | Positive social |
| -S | Negative social |
| I | Pen + object exploratory |
| O | Other active |

**5-minute scan sampling, from 08:00 to 13:00 by 2 observers**

# Saliva Sampling

suckling          nursery          growing/fattening

**CON**
**Total:** 23 litters
**Selection for Saliva:**
17 litters
6 piglets/litter
(low, medium, high birth weight
of male and female)

**ENR**
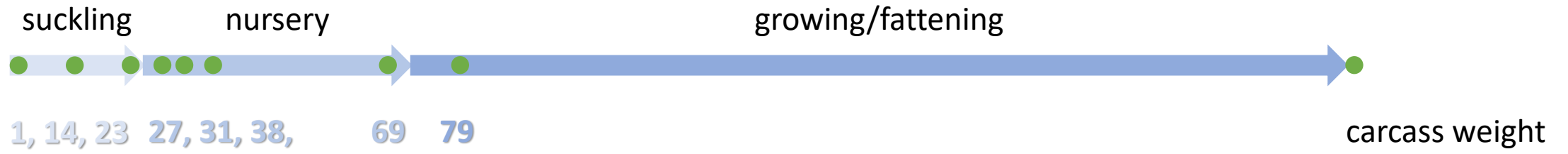**Total:** 24 litters
**Selection for Saliva:**
17 litters
6 piglets/litter
(low, medium, high birth weight
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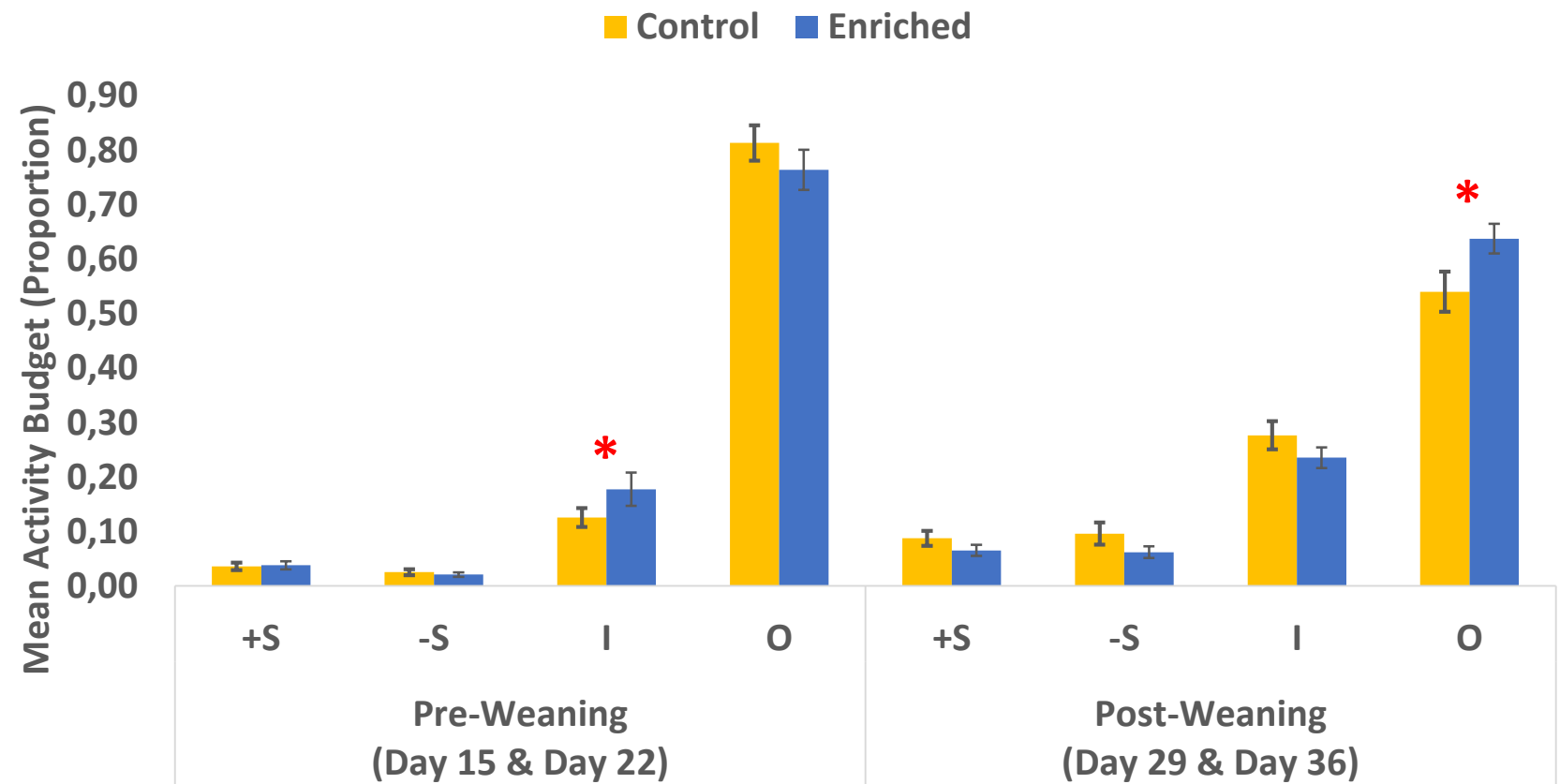**Weaning effect:** 1 day pre-weaning (baseline),1 day and 2 days post-weaning

# Weighing

suckling          nursery          growing/fattening

1, 14, 23    27, 31, 38,          69      79          carcass weight

# Behavior

suckling      nursery                          growing/fattening

15, 22  **29, 36**

| Item | Description |
|------|-------------|
| +S | Positive social |
| -S | Negative social |
| I | Pen + object exploratory |
| O | Other active |

# Salivary Cortisol Level (µg/dL)

# Body Weight (kg)

suckling          nursery          growing/fattening

1, 14, 23    27, 31, 38,          69    79
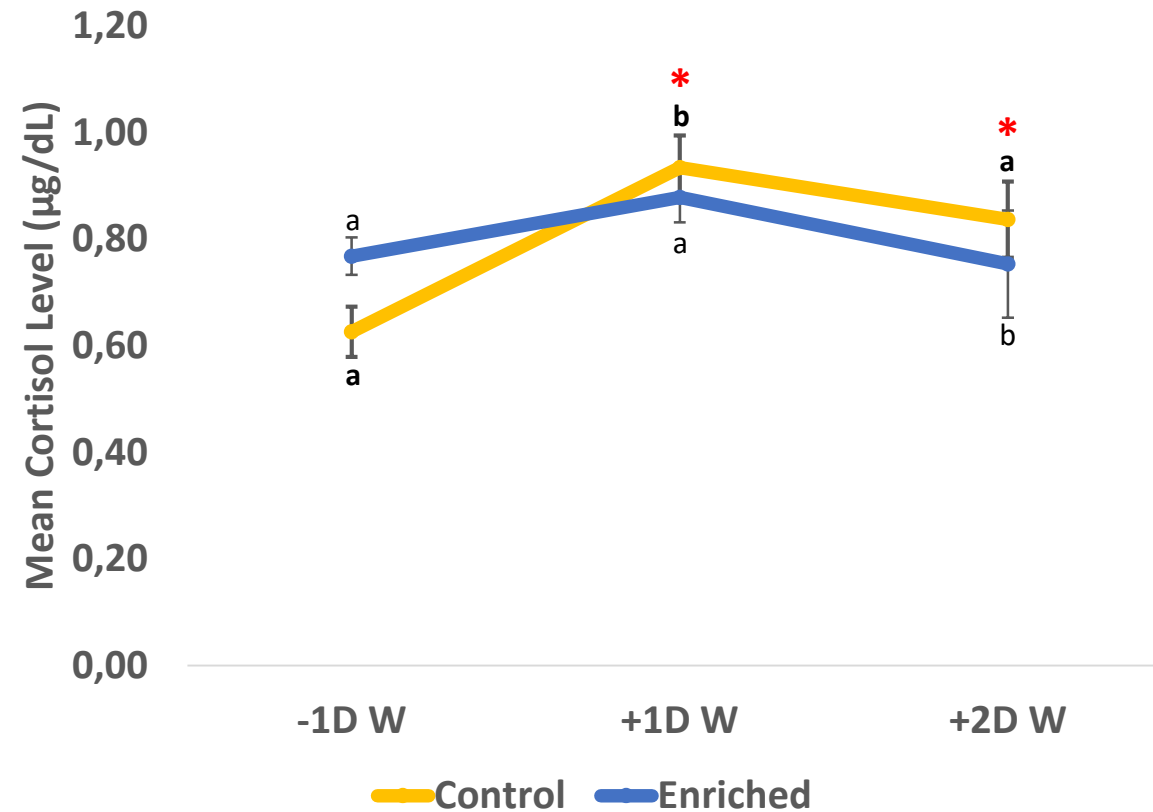
carcass weight
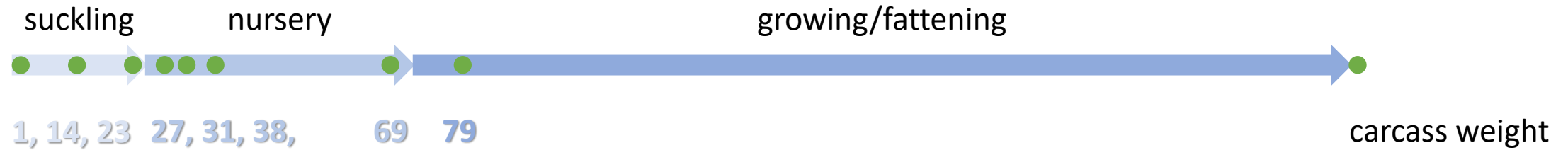
| | suckling (1-24d) | | | | nursery (24-71d) | | | | growing/fattening (71d-slaughter) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day 1 | | Day 23 | | Day 27 | | Day 69 | | Day 79 | | Carcass | |
| | n | mean | n | mean | n | mean | n | mean | n | mean | n | mean |
| **CON** | 324 | 1.38 | 244 | 5.06 | 262 | 5.11 | 209 | 15.36 | 208 | 17.35 | 153 | 91.09 |
| **ENR** | 337 | 1.40 | 286 | 4.91 | 286 | 5.25 | 239 | 15.29 | 234 | 17.85 | 187 | 90.48 |
| *P*-value | 0.85 | | 0.63 | | 0.29 | | 0.91 | | 0.51 | | 0.84 | |

# Average Daily Gain (kg/day); Slaughter Age (days)

suckling     nursery                  growing/fattening

1, 14, 23   27, 31, 38,     69   79                    carcass weight
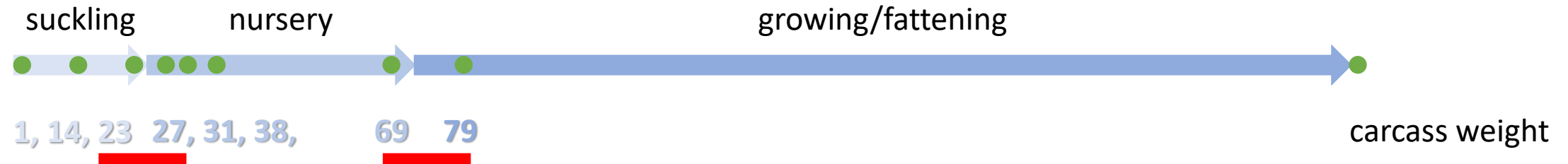
|  | suckling (1-23d) | | **transition** suckling to nursery (23-27d) (g/d) | | **transition** nursery to fattening (69-79d) | | total (1d–EMW*) | | **slaughter age** | |
|---|---|---|---|---|---|---|---|---|---|---|
|  | n | mean | n | mean | n | mean | n | mean | n | mean |
| CON | 224 | 0.165 | 231 | 53.3 | 206 | 0.201 | 146 | 0.575 | 146 | 197.66 |
| ENR | 286 | 0.160 | 271 | 73.9 | 232 | 0.254 | 171 | 0.580 | 174 | 194.85 |
| *P*-value | 0.63 | | **0.09** | | **0.06** | | 0.51 | | **0.09** | |

*Estimated market weight (EMW) = Carcass weight * 1.25

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# Welfare Implication

- Enriching neonatal environment improves weaning (mixing) adaptability, which may benefit long-term performance by reducing the time to reach slaughter weight.

# Acknowledgement