

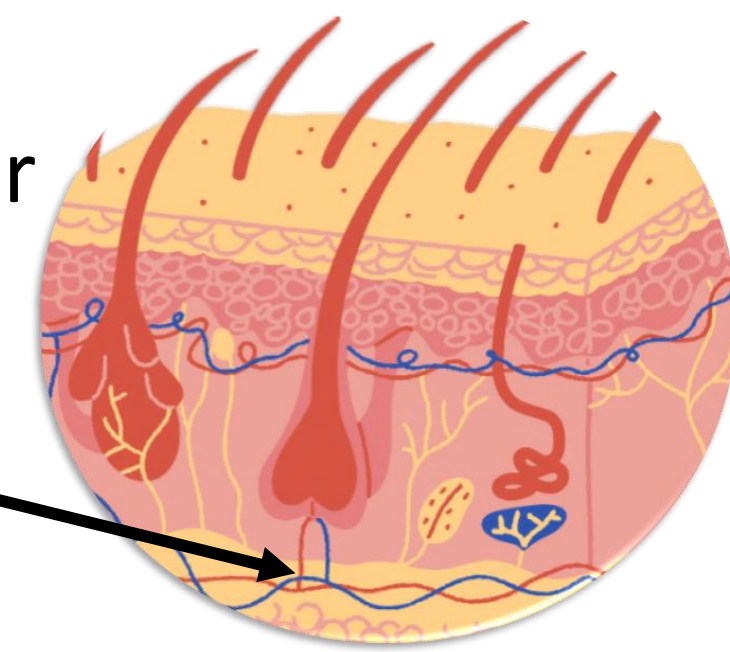


Introduction

- Pigs go through **critical developmental periods** from 0-4 and 4-12 weeks¹.
- **Experiences during this period may impact stress response later in life**^{2,3}.
- Piglets undergo multiple **stressors in early life**⁴
 - Abrupt weaning
 - Painful procedures (can ↑ fear of humans)⁵.
- **Different early life management practices may lessen these stressors**
 - Positive human contact can ↓ fear of humans⁵
 - Enrichment believed to ↓ early life stress⁶
 - Extra space: ↑ play behaviour and exploration

Can we measure chronic stress?

- **Cortisol:** hormone released during stress. ↑ levels suggested to indicate ↑ stress⁷.
- **Dehydroepiandrosterone (DHEA):** hormone opposing roles of cortisol. ↑ levels suggested to indicate ↑ mental and physical health⁸.
- **Cortisol:DHEA ratio:** suggested as a superior measure to cortisol or DHEA alone. ↑ ratio indicative of ↑ stress⁸.
- Hair can measure hormones over extended periods of time⁹.



Hormones from blood stream incorporate into hair during growth

Objectives

To determine if different early life rearing environment effects:

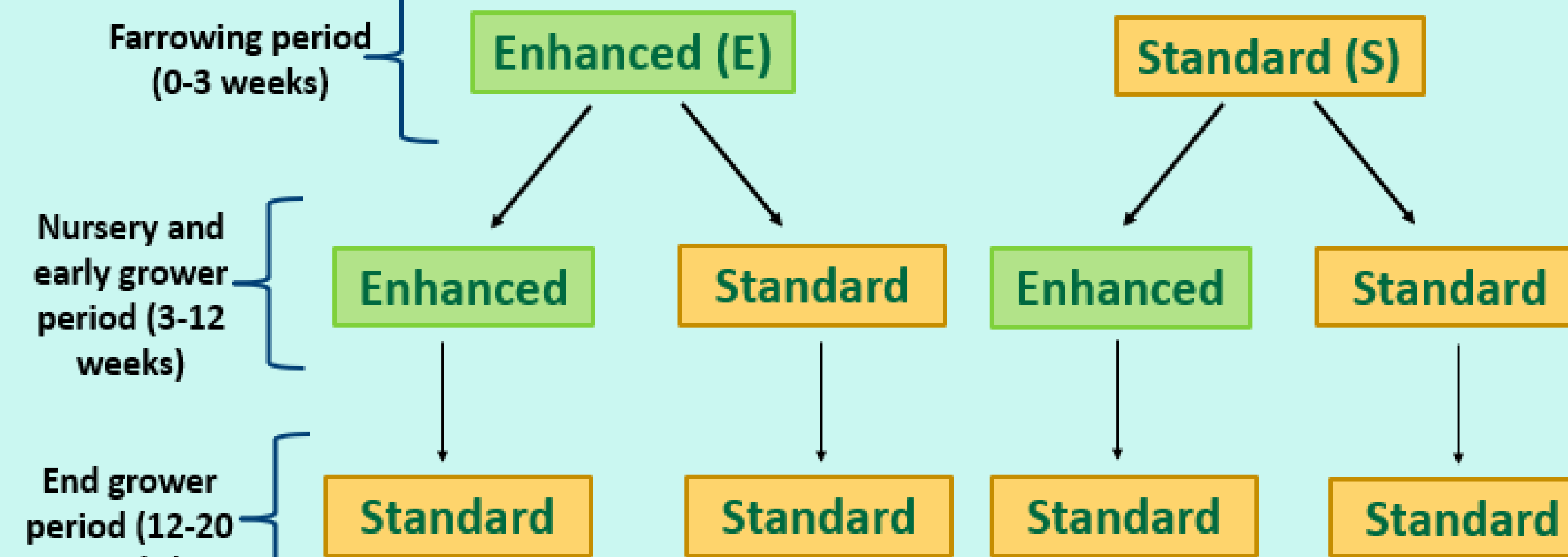
1. Hair cortisol and DHEA concentrations
- a) The average daily gain
- b) The ease of handling
- c) Skin lesions (as a measure of aggression).

References

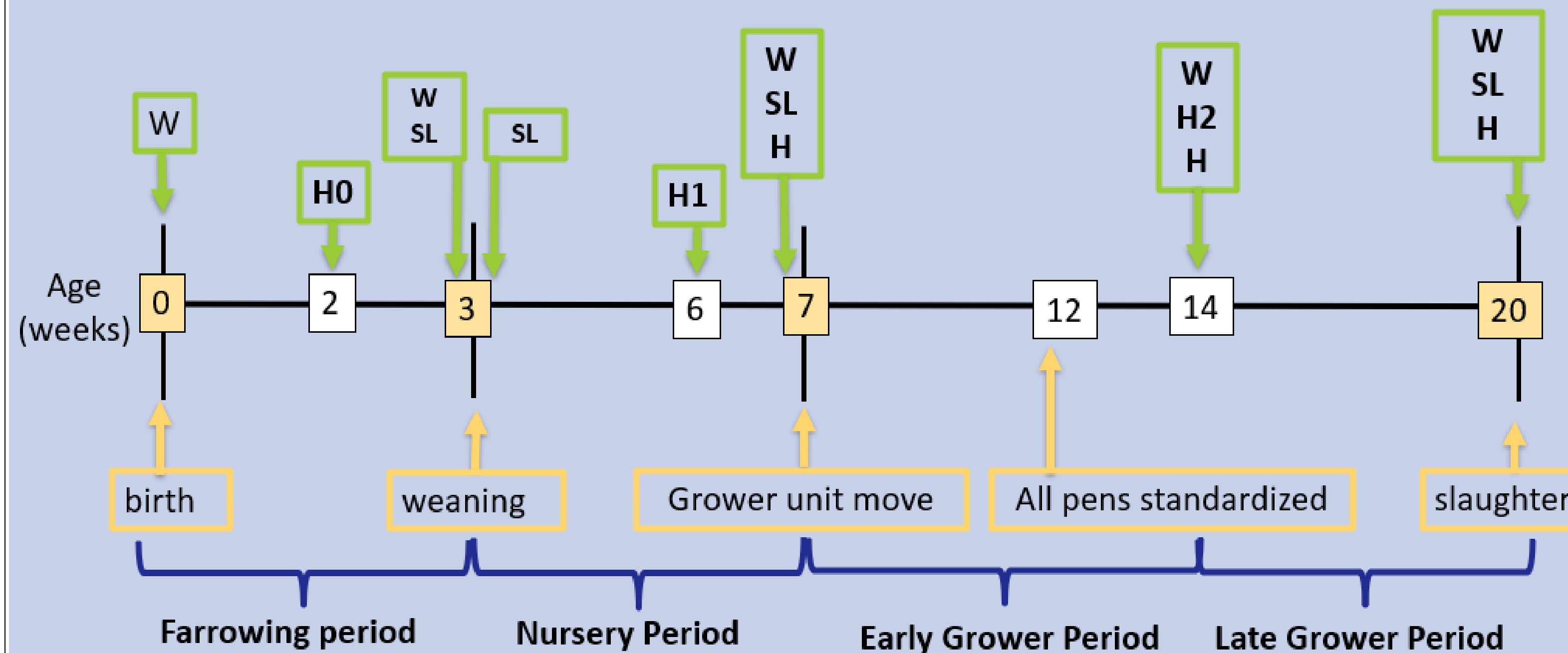
¹ Conrad, M.S., et al., 2012. Dev Neurosci. 34(4): 291-298. ²McLaughlin, K.A., et al. 2015. PNAS: 112(18): 5637-5642. ³Orta, O.R., et al., 2020. Psychoneuroendocrinology. 112:104515. ⁴Lucas et al., 2023. Animal. 100889. ⁵Tallet, C., et al., 2017. Woodhead publishing. Chapter. ⁶Luo, L., et al., 2020. Front Vet Sci. ⁷Kamin and Kertes, 2016. Horm Behav. 89: 69-85. ⁸Stadler, T., and Kirschbaum, C. 2012. Brain, Behaviour and immunity. 26:1019-1029.

Materials and methods

- Enhanced**
- **Increased space**
 - Farrowing: 3.2x1.8m vs 2.3x1.8m pen including sow crate
 - Nursery: 0.39 vs 0.29m²/pig
 - Grower: 1.3 vs 0.98 m²/pig
 - **Positive human contact** (5min/pen 3x/week)
 - **Enrichment** (rope & burlap strips)



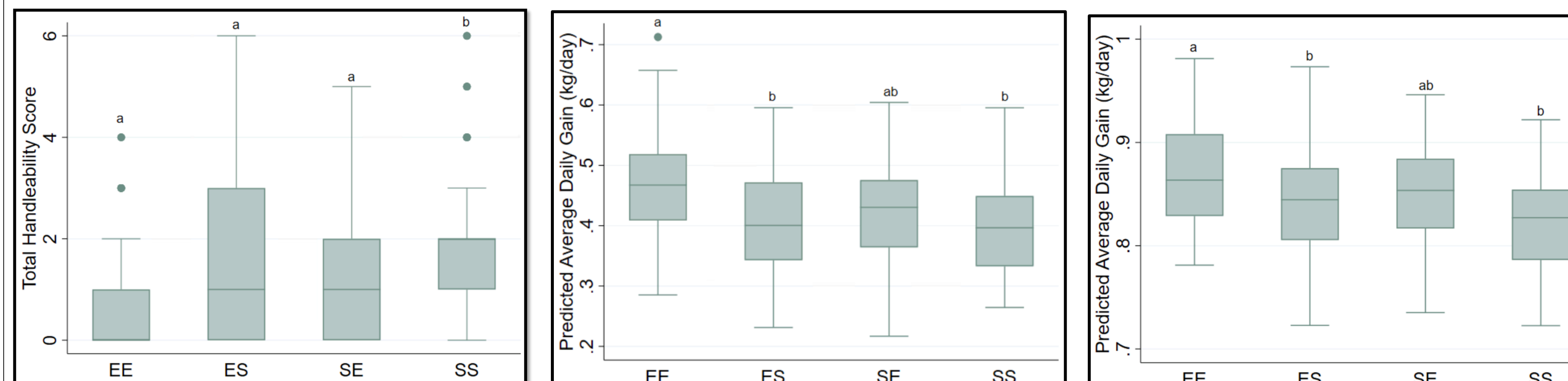
Experimental design. N=8 pens/batch over 4 batches. N=9 (enhanced) – 12 (standard) pigs/pen. N=6 focal pigs/pen, for a total of n=96 focal pigs. N=336 total pigs.



Daily health checks
Weights used for **average daily gain**
Skin lesion score from 0 (no lesions)-3 (severe lesions) of the ears, face, upper body, mid body, lower body, and tail.
Handleability score when moving (0=easily moved, 3=extremely difficult to move) into a weigh crate and their response (0=calm, 3=vocal with escape attempts) inside the weigh crate.

H0= Hair representing in utero time discarded, H1: hair representing farrowing period, H2: hair representing 8-12 weeks, SL= skin lesions, W=weight, H=handleability

Results



The total handleability score at the end of the nursery period

The average daily gain during the nursery period

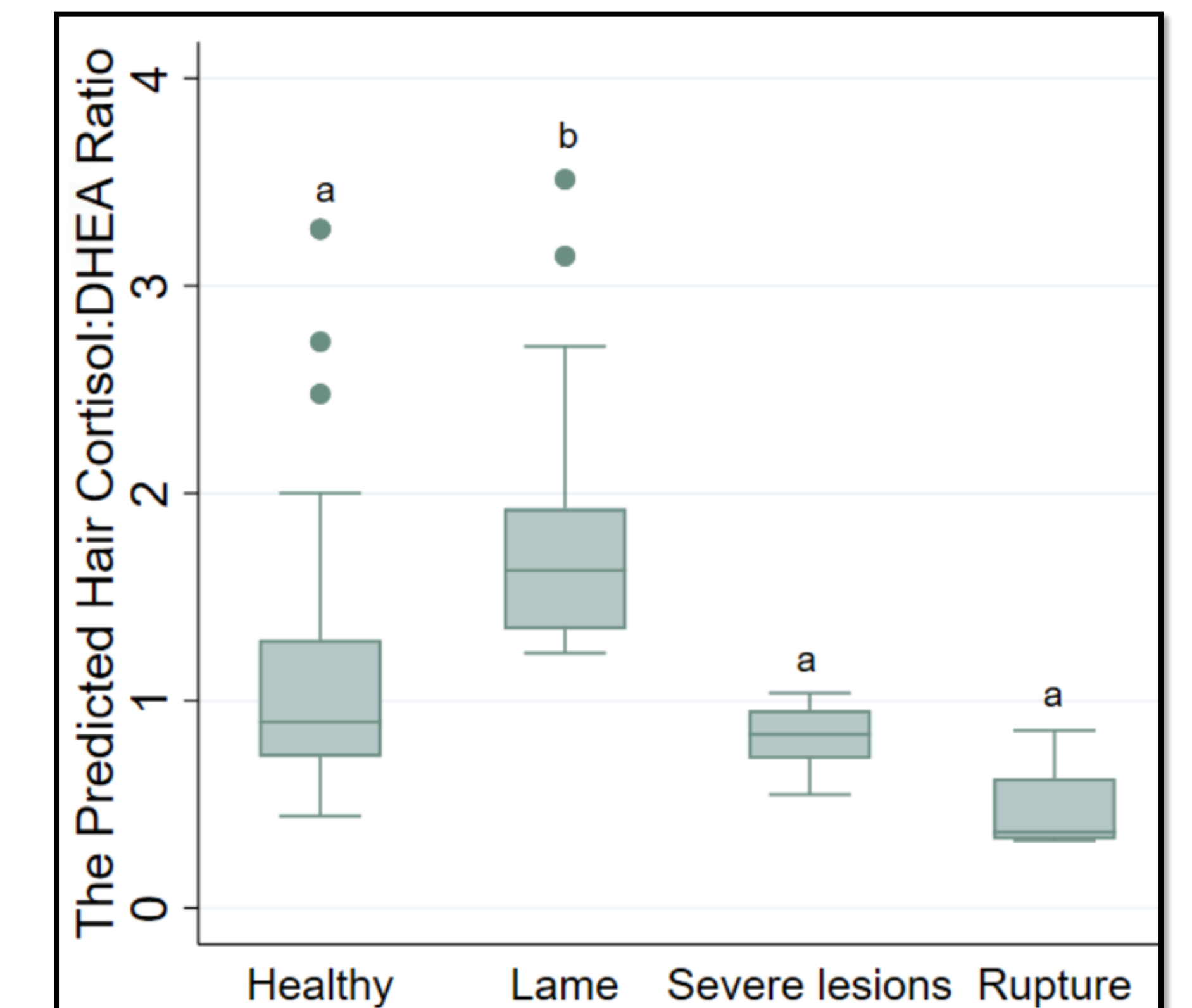
The total lifelong average daily gain

n= 336 pigs with 84pigs/batch. Significant differences shown by different letters and set at p<0.05. Box plot represents the median, with the first and third quartiles and the minimum and maximum values. E=enhanced, S=standard

No difference in ADG in the farrowing period, or in either grower stage.
No difference in handleability at 14 or 20 weeks of age

Results

No effect of early life environment on hair hormone concentrations or skin lesions



The predicted hair cortisol:DHEA ratio reflecting the pre-weaning period in piglets with different health statuses. n=159 healthy, n=20 lame, n=6 severe facial lesions, n=6 taped rupture. Letters denote significant differences between groups. Significance set at p<0.05. Box plot represents the median, with the first and third quartiles and the minimum and maximum values.

Conclusions

Pigs with enhanced environments from 0-12 and 4-12 weeks of age had:

- ↑ lifelong ADG
- ↑ nursery ADG
- easier handleability at 8 weeks
- no ADG differences pre-weaning or in grower unit
- no skin lesions differences
- No hair hormone differences

Piglets with pre-weaning lameness had:

- ↑ hair cortisol:DHEA ratio.
- An objective measure of individual welfare?

Acknowledgements

