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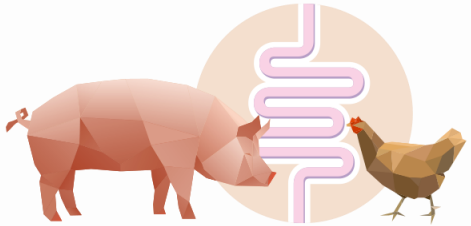

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Optimal gut function in monogastric livestock

Effect of creep feeding (dry or liquid) and pen hygiene (standard or optimal) on pre-weaning feed intake and growth in pigs.

Shiv Ramveer Vasa; Gillian E. Gardiner, Keelin O'Driscoll, Giuseppe Bee, Peadar G. Lawlor

EAAP 2023 session 49/ 30-08-2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 955374.

Abstract

Creep feeding (dry, liquid) and pen hygiene (low, high) impacts pre-weaning growth in pigs

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Increasing pre-weaning creep feed intake can increase pig weaning weight (WW) and better prepare pigs for weaning. The objective was to evaluate the effect of providing creep feed in dry or liquid form to suckling pigs housed in a low or high hygiene environment, on their growth and intestinal structure. Eighty seven sows, blocked by parity, number of pigs weaned and live-weight, were randomly allocated to one of the four treatments in a 2×2 factorial arrangement. The factors were creep feeding (dry or liquid) and pen hygiene (low or high). Pigs were provided with dry pelleted starter diet from day (d) 10-28, or a mixture of liquid milk and starter diet from d3-28. Either a sub-standard cleaning protocol (water wash, no detergent or disinfectant and no drying) or an optimal cleaning protocol (detergent application, water wash, disinfectant application and thorough drying) was used to obtain a low or high hygiene environment, respectively in the farrowing rooms. Pigs were weighed and feed disappearance recorded on d4 and 28 (weaning) of age. On d4 post-weaning (PW), 10 pigs/treatment were euthanized to collect tissue samples for histological analysis. Data were analysed using PROC MIXED (v9.4, SAS Institute Inc.). There was a creep feeding × hygiene interaction on WW. Liquid feeding increased WW in both high and low hygiene environments (P0.05). On d4 PW, jejunal villus height and crypt depth were increased by high hygiene in farrowing rooms (P0.05). In conclusion, high pen hygiene increased pre-weaning feed intake and improved intestinal structure, whereas liquid creep feeding increased growth and WW. Funded by EU Horizon 2020 under grant agreement No 955374.

Acknowledgements: This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement N°955374.

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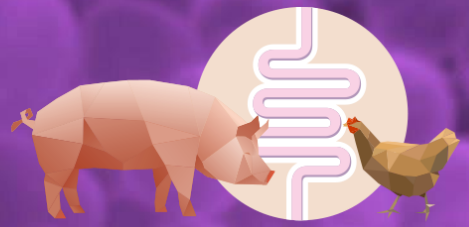

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01

Introduction

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Introduction

- Litter size ↑ but ↑ colostrum/milk → limiting growth & weaning weight of piglets

Creep feeding

Commonly practiced with dry pelleted starter diet

- **↑ weaning weight**
- **Early exposure to plant ingredients**
- **↑ pw feed intake**

- Liquid creep feeding can ↑ feed intake (Byrgesen et al., 2021; Lyderik et al., 2023)
- Hygiene status of farrowing room can affect creep feed intake (Halpin et al., in review, Le Floc'h et al., 2009; Kahindi et al., 2014)

Hypothesis:

Liquid creep feeding & optimal pen hygiene environment will increase feed intake & growth of suckling piglets while reducing the need to medicate pigs leading to increased post-weaning intake & growth.

Research questions:

Does environmental hygiene influence the response to liquid creep feeding of suckling pigs?

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02

Materials and methods

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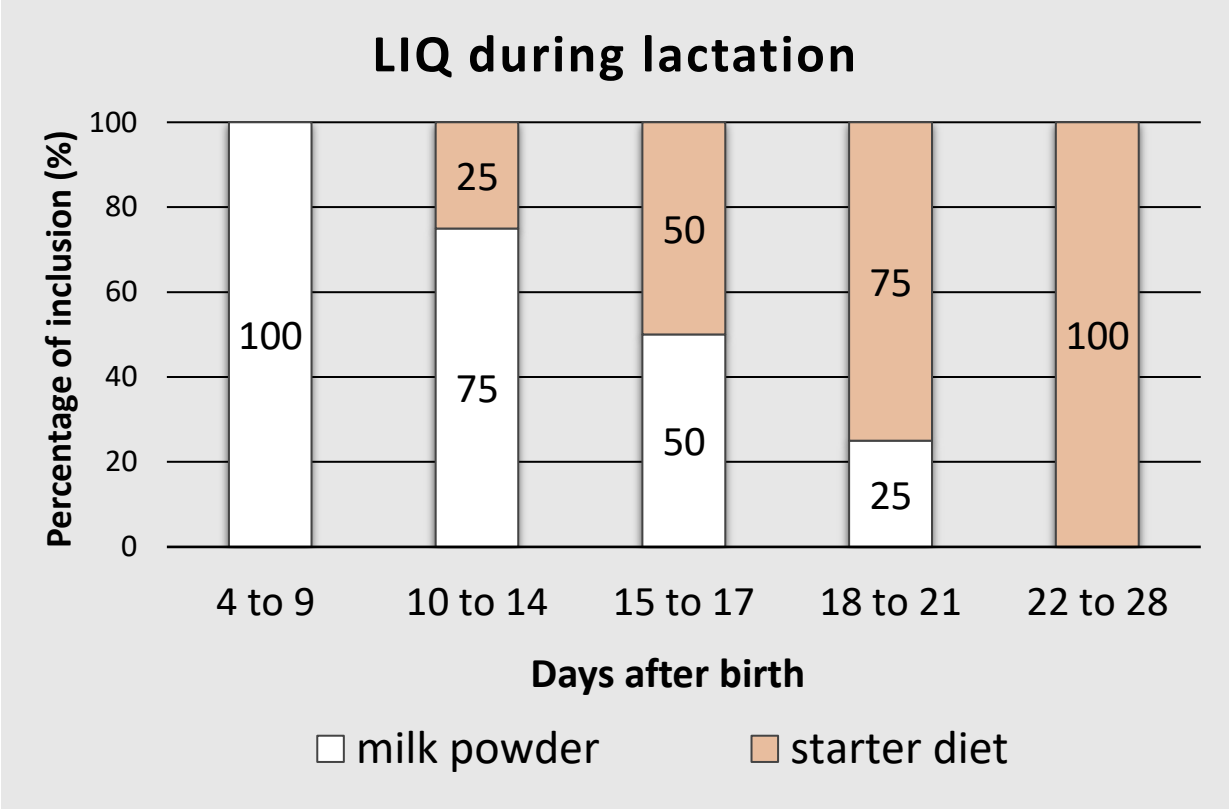
2.1 Material & Methods

- 87 sows blocked by parity, piglets weaned in previous farrowing and body weight at d107 of gestation
- Similar litter size within each block
- Piglets - (Large White x Landrace) x Duroc

Pre-weaning treatments		
Creep Feed / Pen Hygiene	**Dry pelleted starter diet from D10 (DRY)**	**Liquid creep feeding from D4 (LIQ)***
OPTI (Optimal)	OPTI-DRY	OPTI-LIQ
STAN (Standard)	STAN-DRY	STAN-LIQ



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*** Liquid mixture of milk (Swinco) and starter diet with 14 to 15% DM**

2.2 Materials & Methods

Table: Nutrient and energy content of the milk powder and starter diet.

Calculated nutrient composition	Milk powder	Dry starter diet
Net energy (MJ/kg)	11.9	12.1
Fat (g/kg)	90	122
Protein (g/liter)	215	200
Lysine (g/liter)	18	16.2

Automatic delivery system

- Babyfeed from Schauer

- Trough feeder

- Feeding for ~18 hours/day

- Sensor check every ~25 mins.

- Versatile feeding programs

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2.3 Material & Methods

Cleaning protocol- farrowing room* Prior to moving sows	
STAN pen environment	**OPTI pen environment**
Washing with water only No detergent and/or disinfectant applied	Pre-soaking with water Apply detergent, wash, dry, chlorocresol disinfectant application, dry
≤ 18 hours of drying time	6 days drying
Sows not washed prior to entry	Sows washed and disinfected prior to entry

Measurements

- **Microbiological plating- pen floor swabs**
- **Weighing and feed disappearance**
  Day 4 and day 28 (at weaning)
- **Medication usage and clinical cases**
- **Visually scored incidence of diarrhoea**
- **Dissect sub-set d4 post-weaning**
  Intestinal histology
- **Statistical analysis- SAS v 9.4**
  PROC MIXED|PROC GENMOD
  Tukey-Kramer adjustment

*Halpin et al., in review

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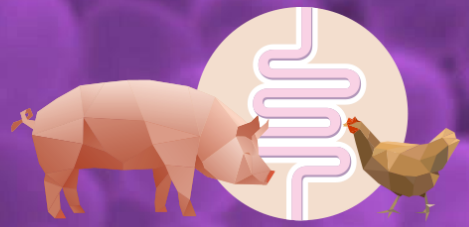

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03

Results

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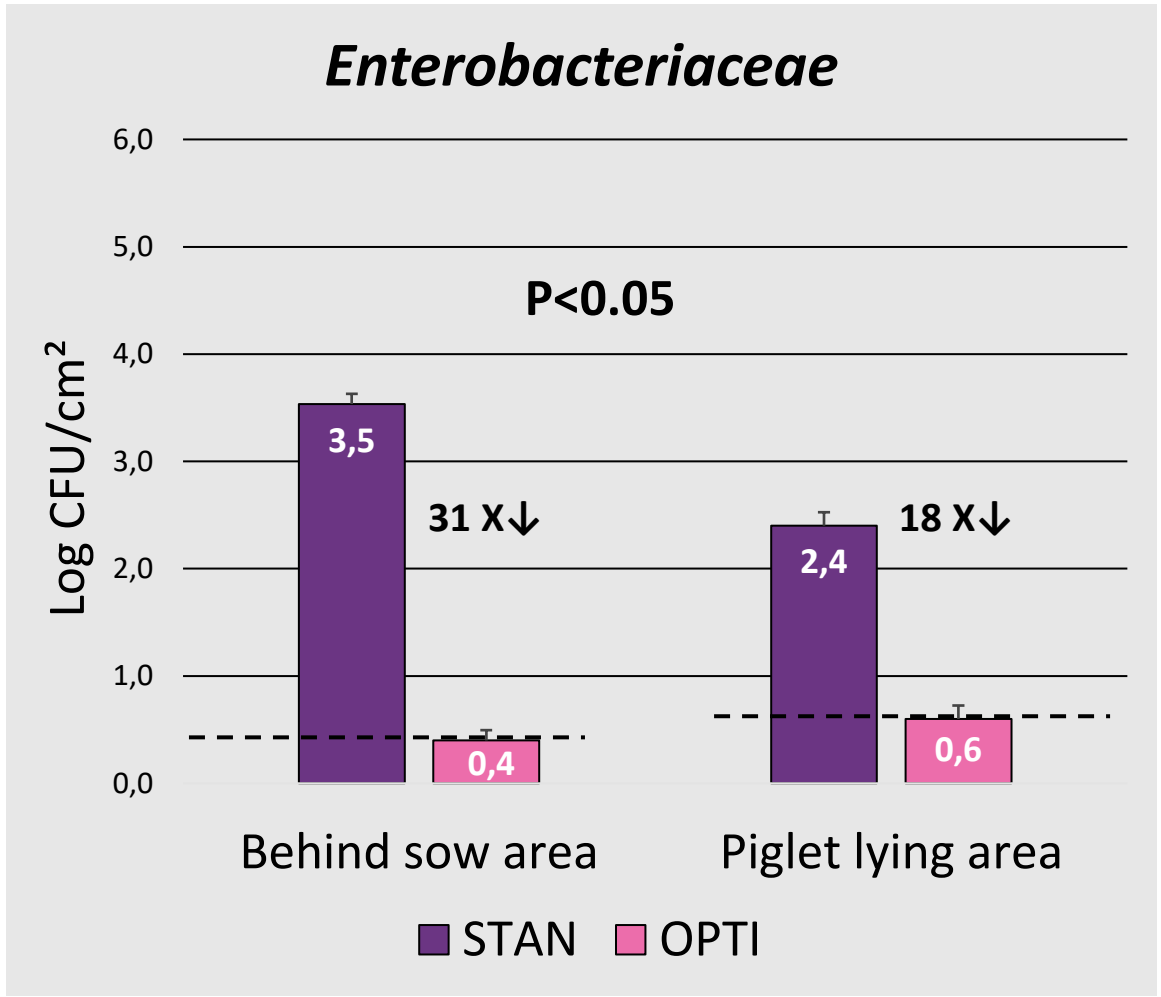
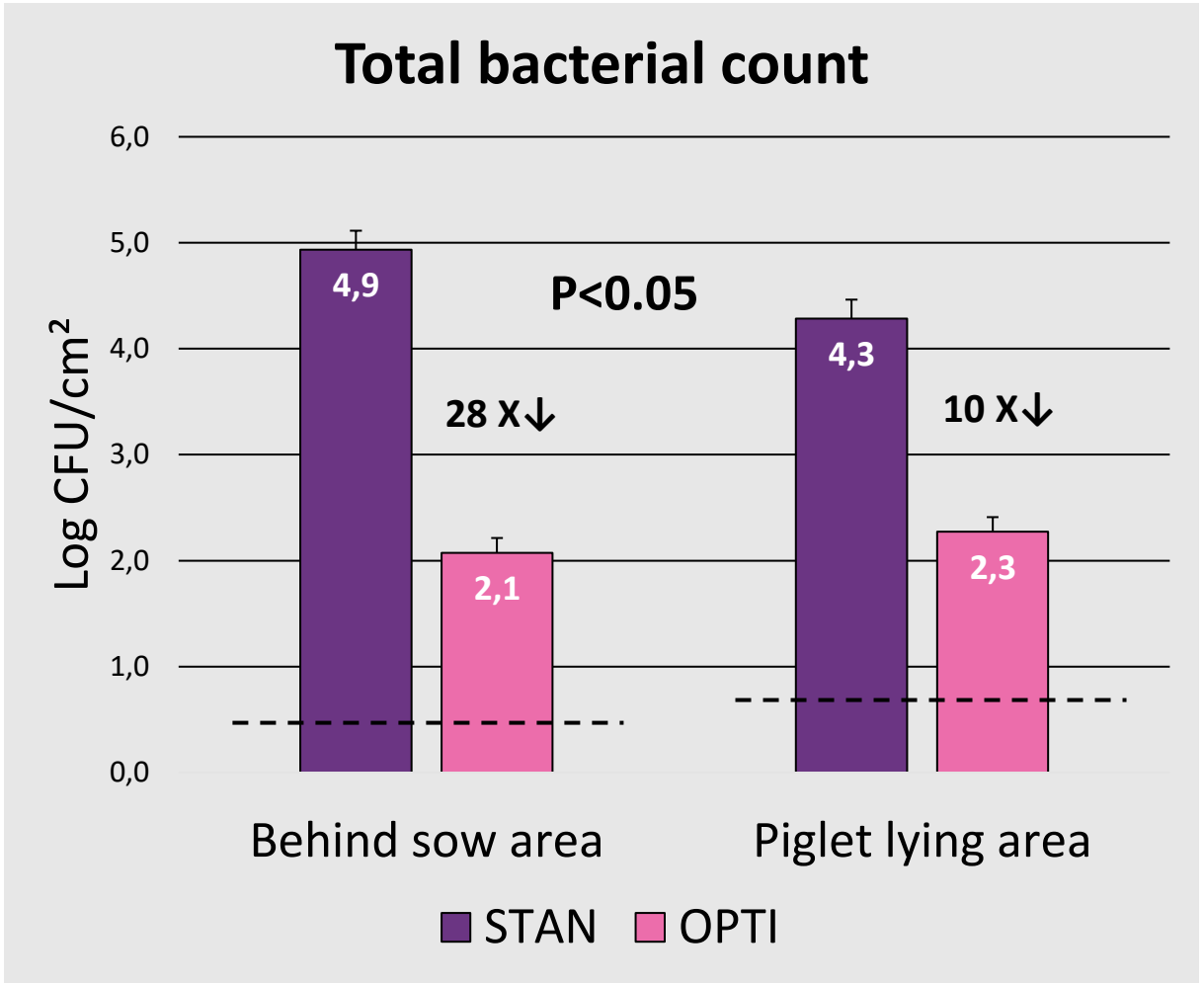
3.1 Results

Microbial counts - pen floor swabs after cleaning





- - - - **Limit of detection**

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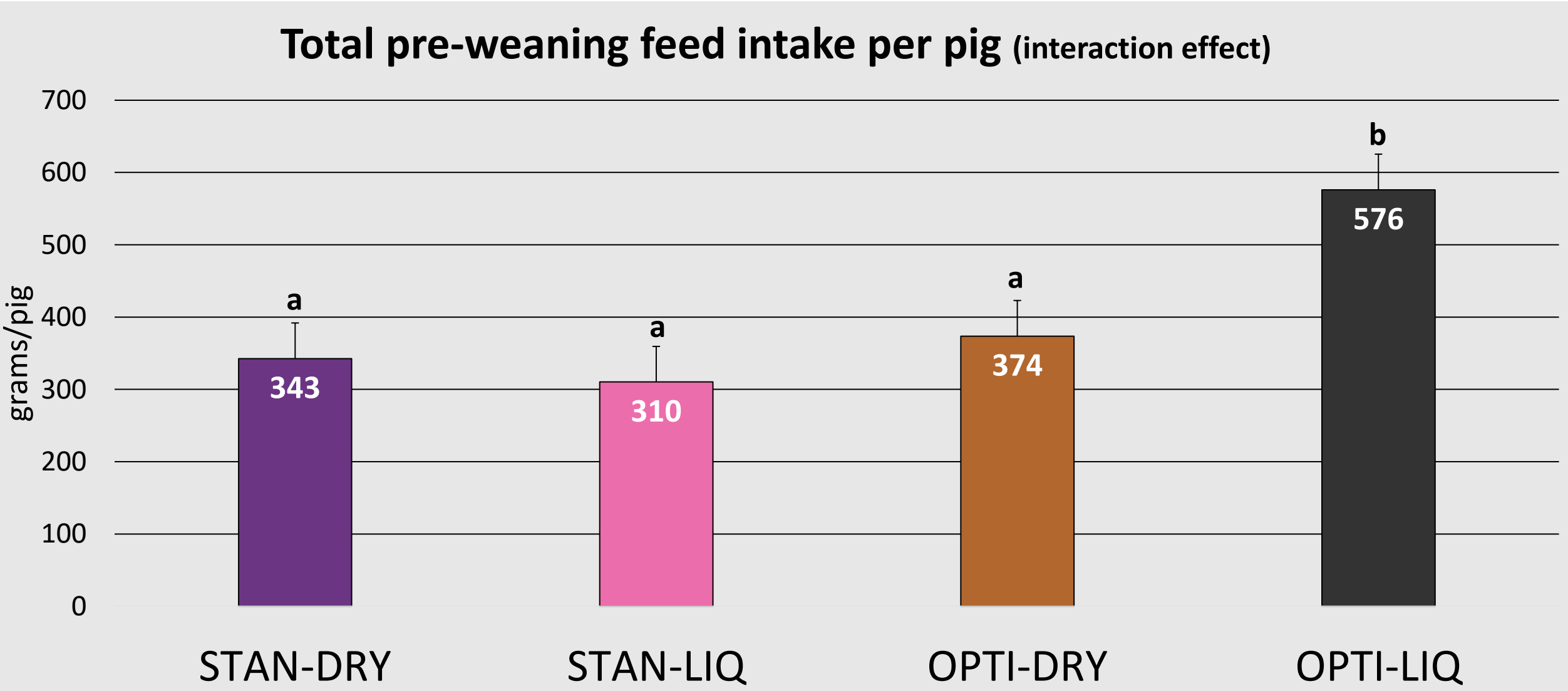
3.2 Results



a-b Bars that do not share a common superscript differ significantly at P<0.05

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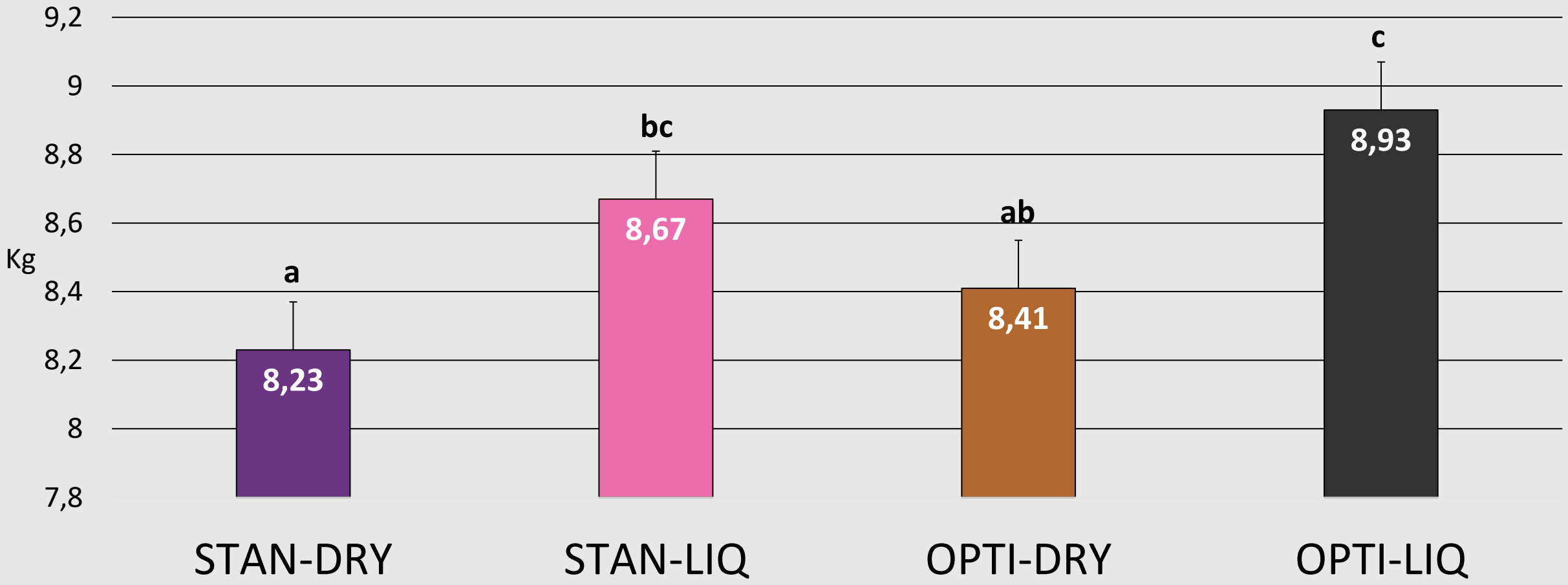
3.3 Results



a-c Bars that do not share a common superscript differ significantly at P<0.05

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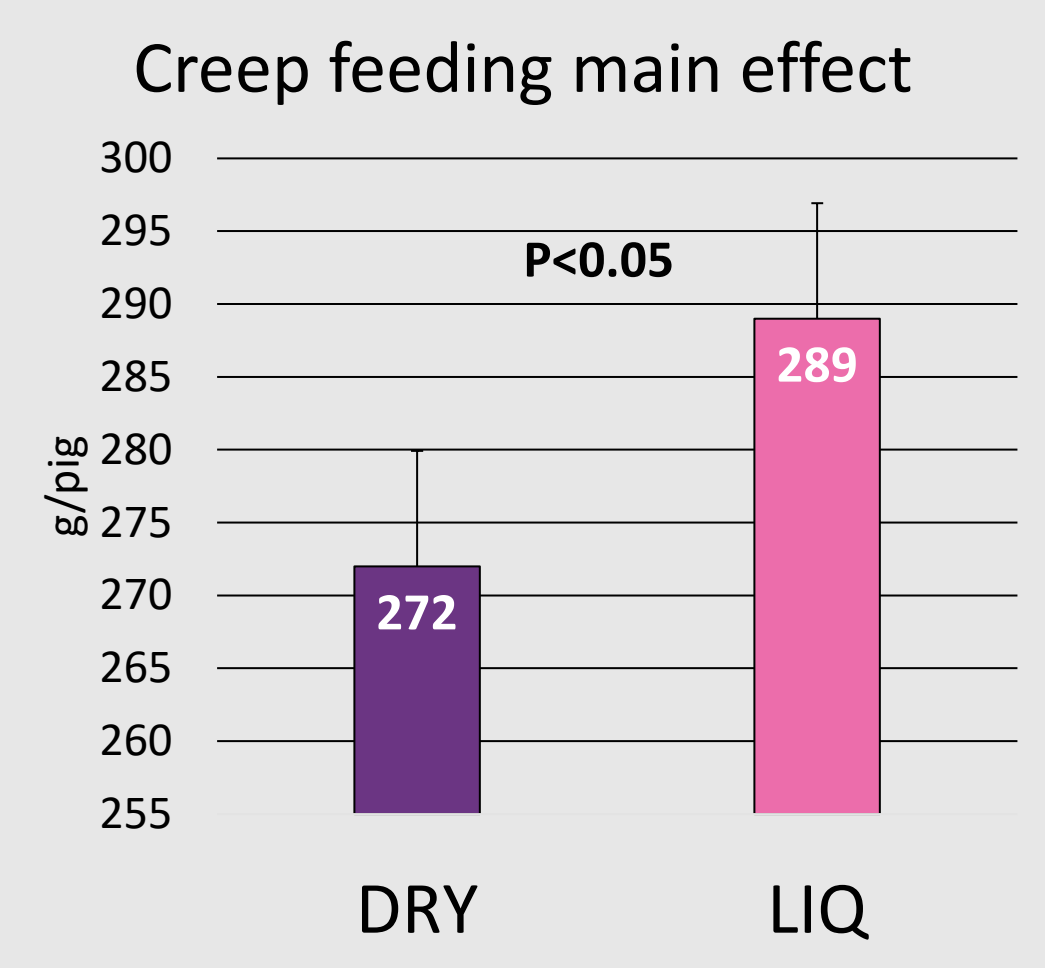
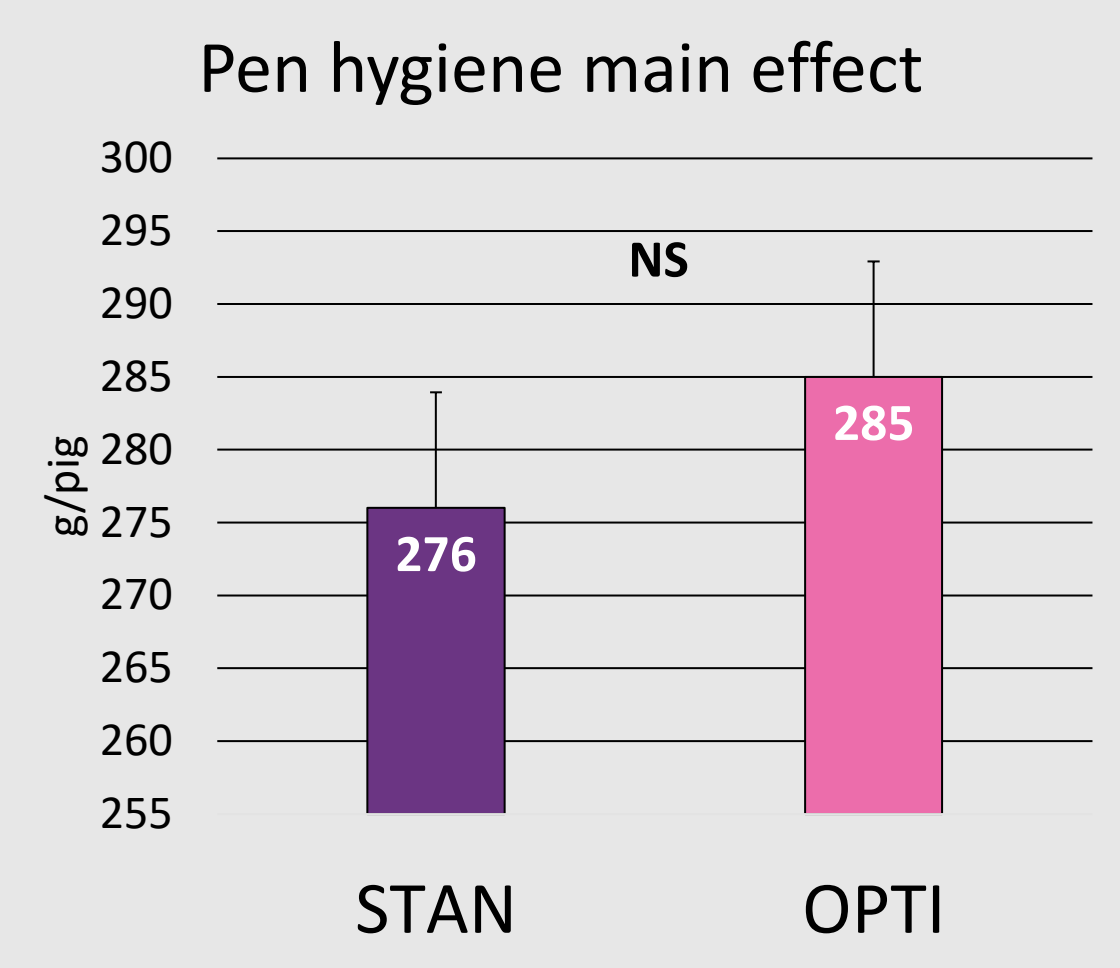
3.4 Results

ADG from D4 to 28 (No interaction effect; P>0.05)





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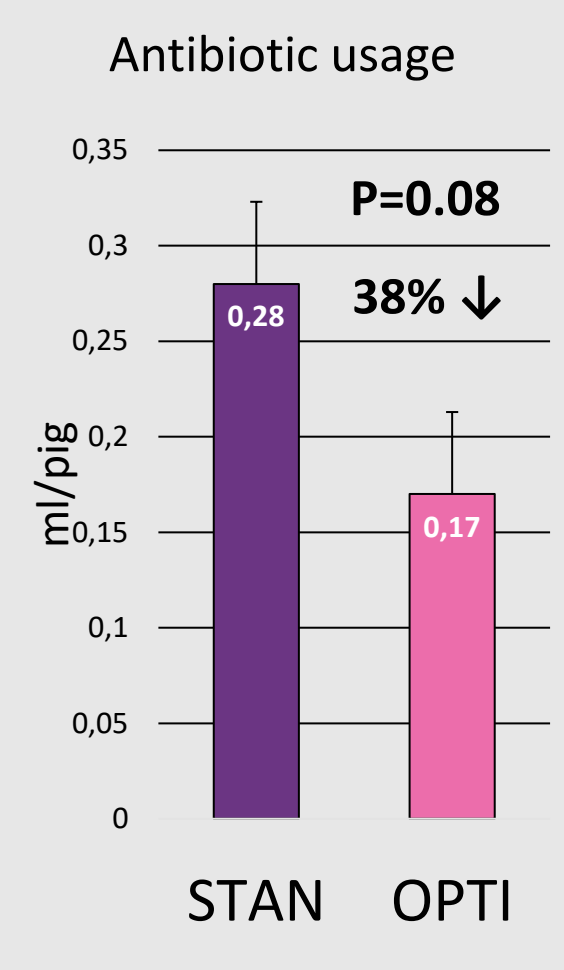
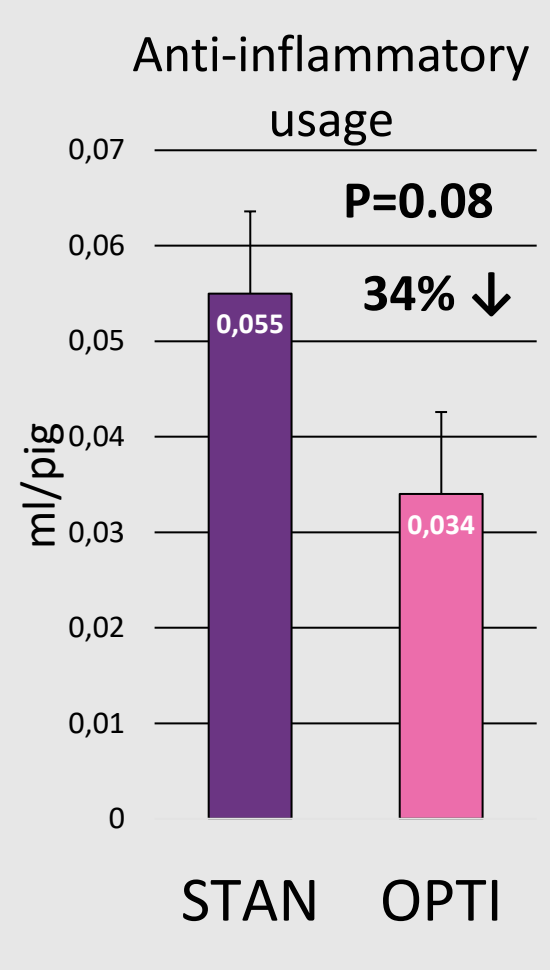
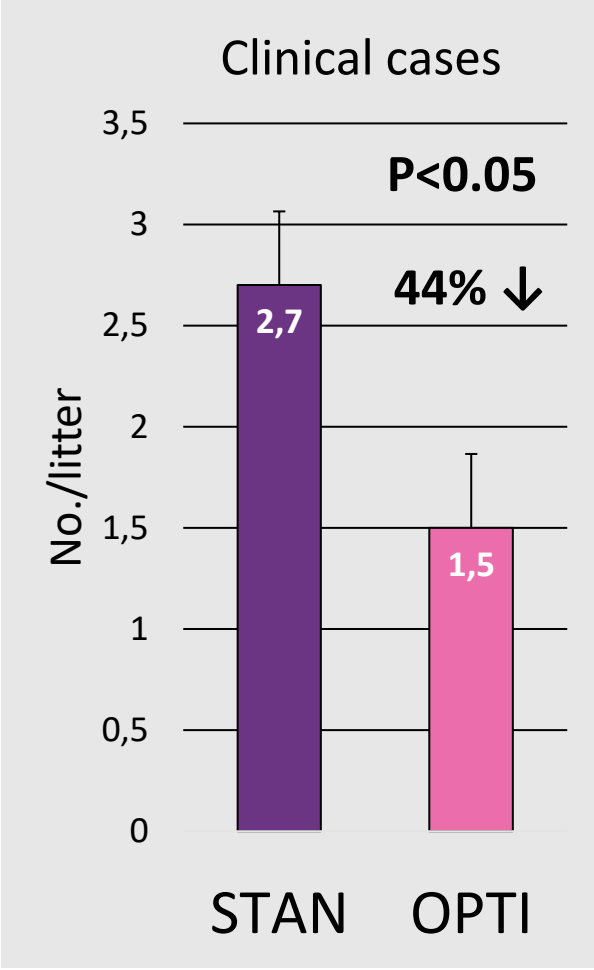
3.5 Results

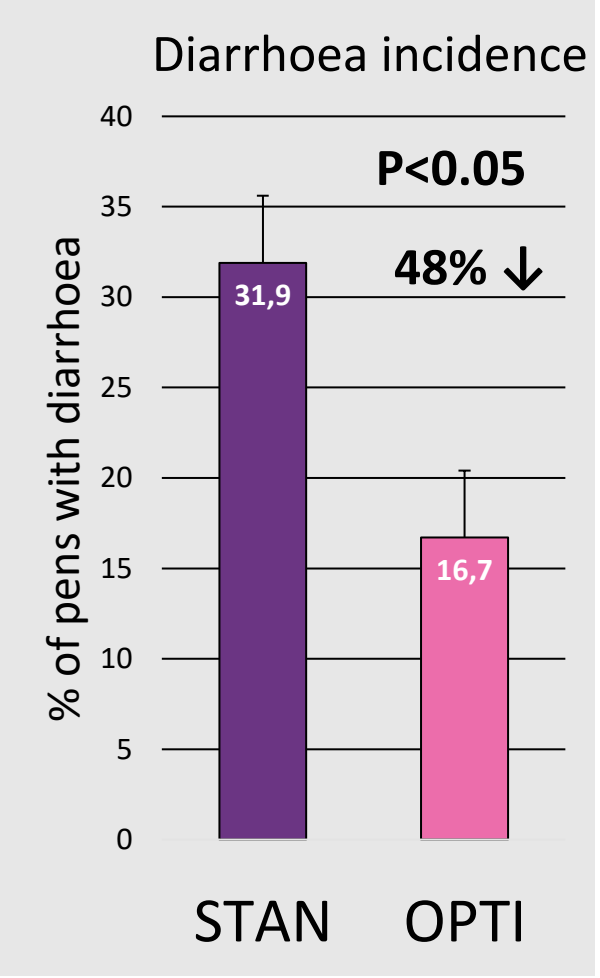
Medication usage, clinical cases and incidence of diarrhoea

(No interaction & feeding effect; P>0.05)









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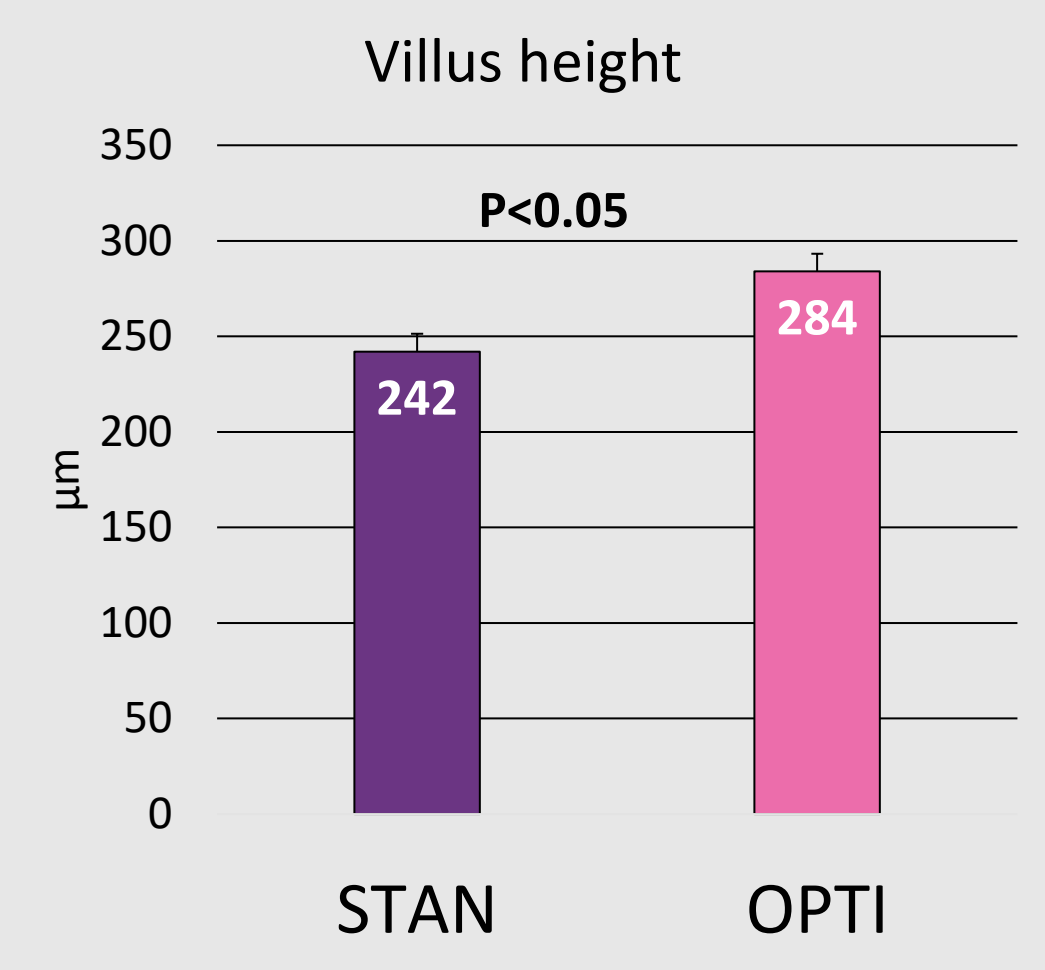
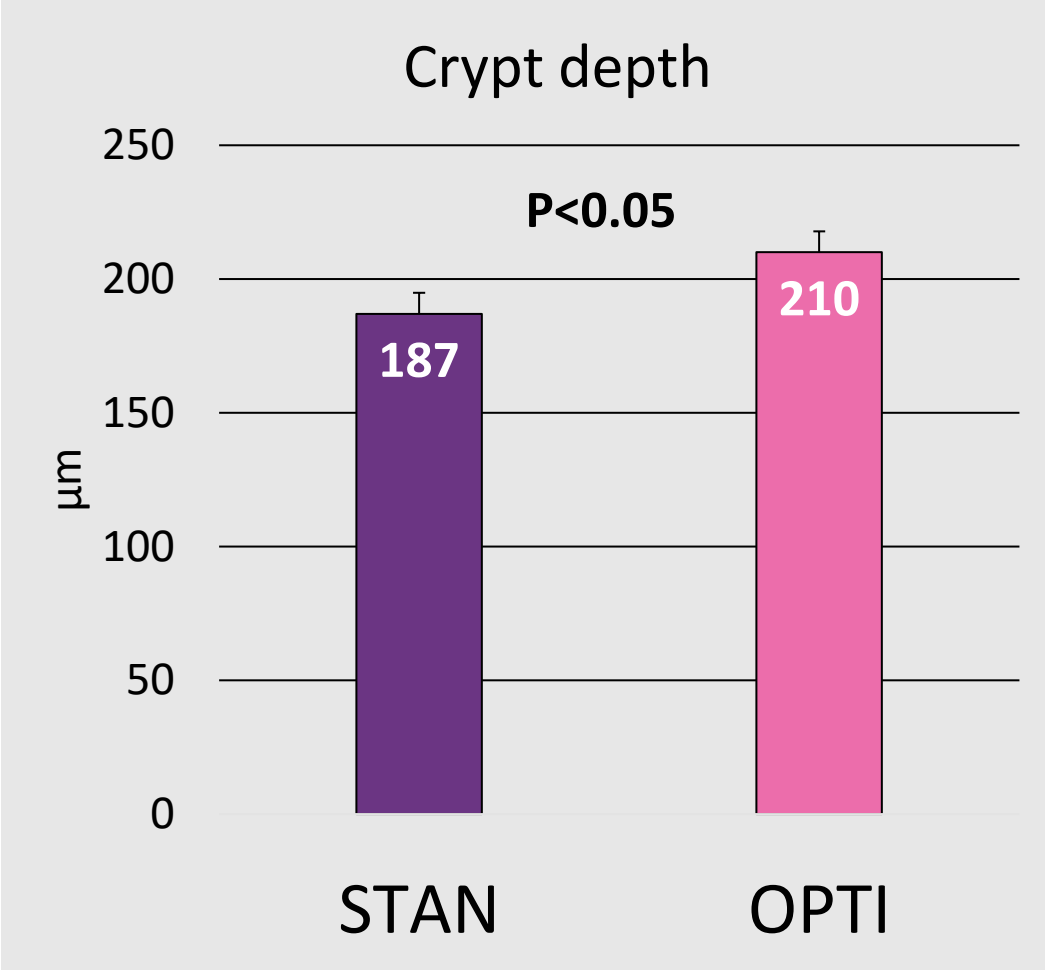
3.6 Results

Jejunal histology at day 4 pw (No interaction & feeding effect; P>0.05)





No difference in villus height to crypt depth ratio

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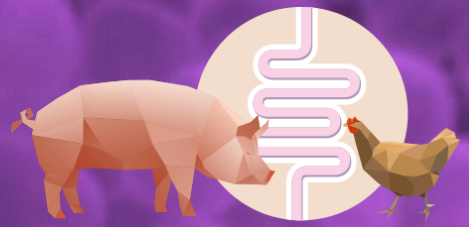

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04

Discussion

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Discussion

- **Liquid creep feeding with optimal hygiene – best growth & feed intake pre-weaning**

- **Liquid creep feeding in standard hygiene pens → weaning weight ↑**
  - Higher lactose intake (Zhao et al., 2021)

- **Optimal pen hygiene pigs → less clinical cases + lower incidence of diarrhoea**
  - Less immune system stimulation → Increased feed intake + less energy diverted from growth (Johnson and von Borell, 1994; Dantzer, 2004, Pluske et al., 2018)

- **Optimal pen hygiene pigs → increased villus height and crypt depth post-weaning**
  - Possibly due to lower infection pressure & differences in microbiome (Duarte et al., 2020; Law et al., 2021)

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THANK YOU

Do you have any questions?

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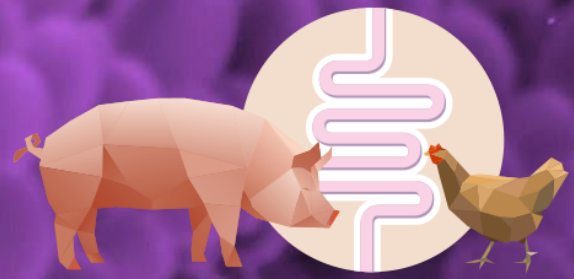

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