

Impact of improved hygiene: Farrowing accommodation and liquid feeding systems

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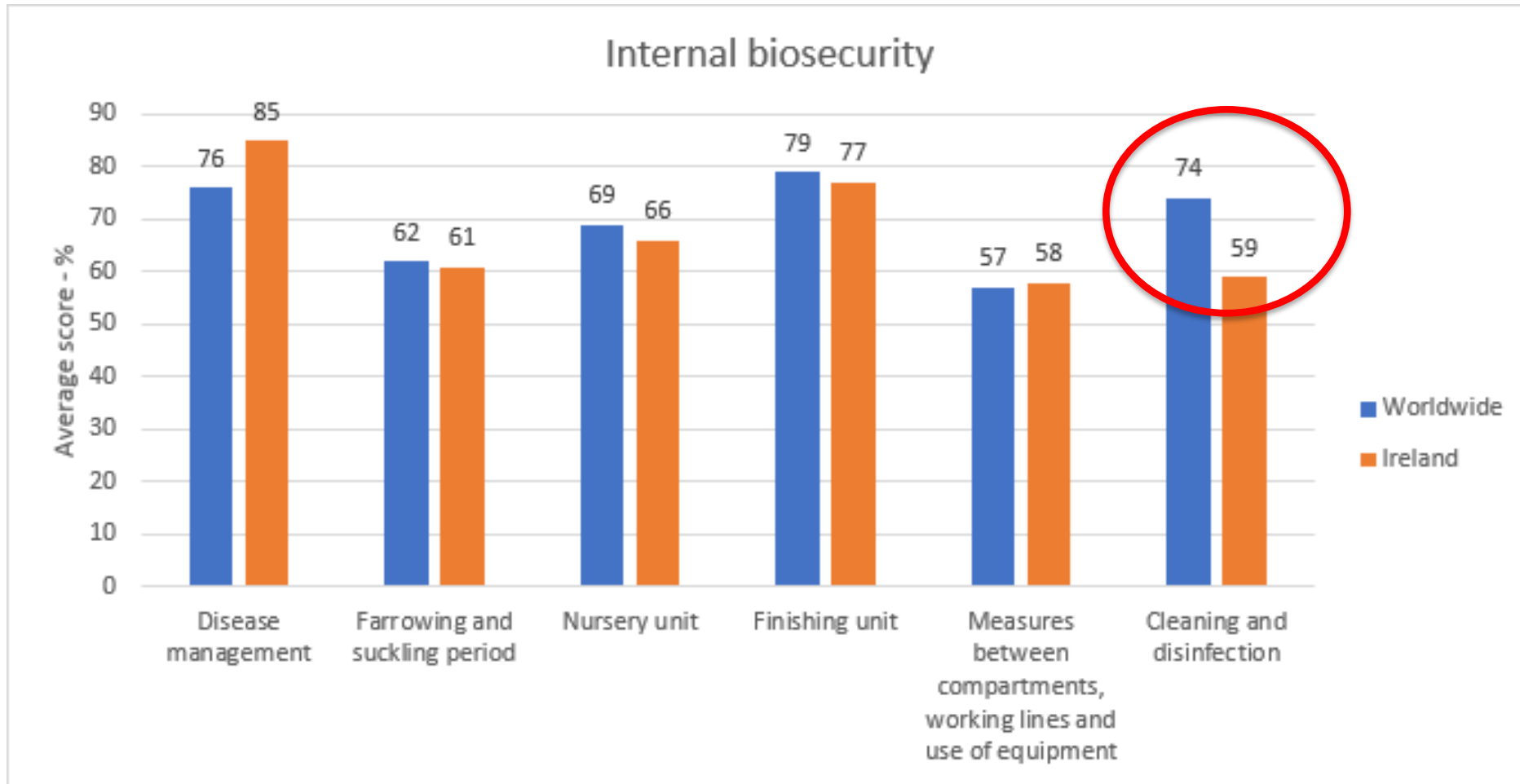
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Introduction

- ↑ internal biosecurity: ↑ pig growth and ↓ mortality & antibiotic usage
- But, many factors are associated with internal biosecurity
- Impact of measures such as cleaning & disinfection routines not always clear
 - Implementing correctly takes time, and
 - Temptation to take short cuts or, worse, avoid altogether, particularly where labour & space limiting
- Two very different but critically important areas on the unit regarding hygiene
 - Farrowing accommodation
 - Liquid feeding systems

1. Farrowing Accommodation Hygiene

Internal Biosecurity- Pig Health Check



Introduction

- High use of antibiotics linked to spread of AMR from animals to humans
 - Increased restrictions on antibiotic use in EU January 2022
 - Therapeutic levels of in-feed zinc oxide banned in EU June 2022

All happening when litter size ↑- piglet weight and health to weaning

- Internal biosecurity measures shown to ↑ pig growth, ↓ mortality (Laanen, et al. 2013) and ↓ antibiotic usage (Postma, et al. 2017)
- We believe farrowing accommodation hygiene to be particularly important
- **Objective:** ↓ the need to medicate suckling piglets & ↑ piglet growth by implementing an optimised sanitisation routine in farrowing accommodation



Farrowing Accommodation Hygiene

Sub-optimal vs. improved/optimal cleaning and disinfection protocol

- ~22 litters/pens on each protocol
- Average born alive – 14.9
- 2 batches of pigs

Parameters measured:

- Microbiology: Total bacterial and *Enterobacteriaceae* counts in farrowing pens
- Growth: Individual piglet weight
- Health: Clinical cases, no. injections, antibiotic & anti-inflammatory usage per litter

Study

Optimal sanitisation routine for farrowing accommodation



Pre-soak pens with water overnight (≤ 18 hr)



Chlorocresol-based disinfectant (Interkokask®)

Dry 6 days, blow heater 1st 24 hr



Detergent (Blast Off - Carboxylic acid) - 20 min
Power wash
Dry overnight with blow heater



Sows: washed & disinfected (Virkon® S – potassium sulfate) pre-entry to farrowing crates

Sub-optimal sanitisation routine for farrowing accommodation

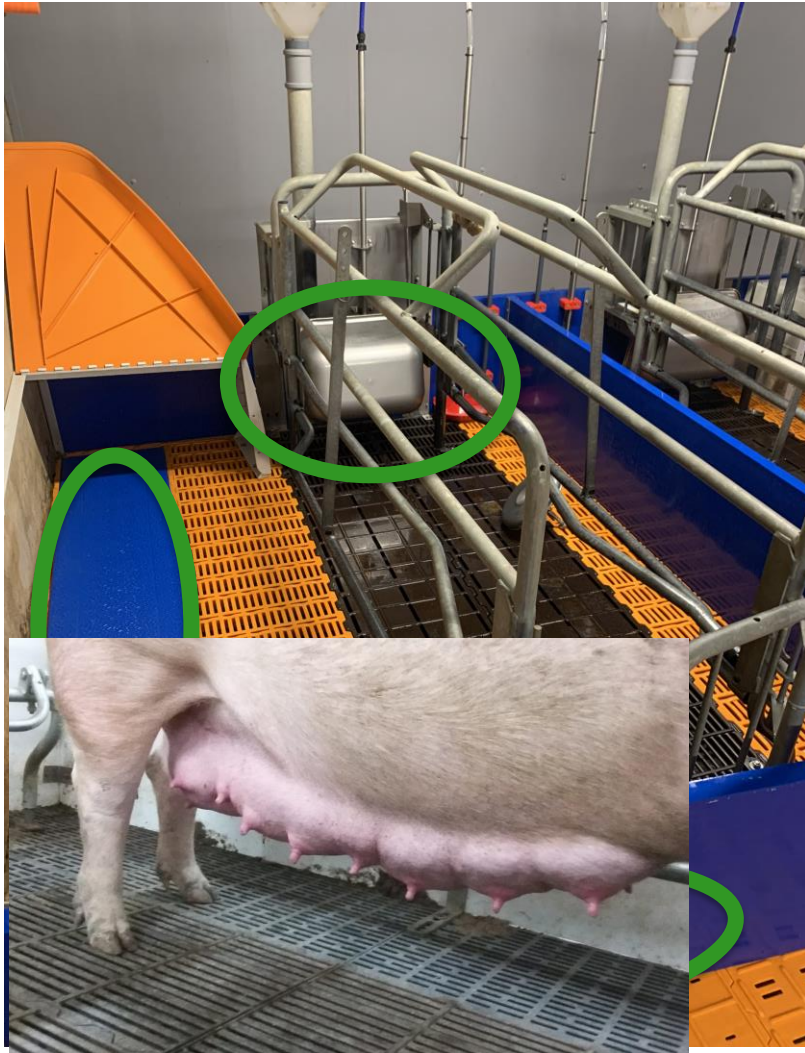


Washing pens with water

Dry overnight (≤ 18 hr)

Swabbing of farrowing pens

Areas swabbed



Sow feeder

Piglet lying area

Floor area behind the sow

Wall behind the sow

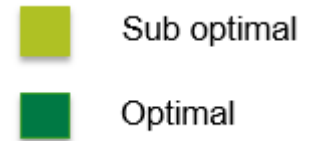
Piglet drinker

Sow's udder

Swabbing of pens

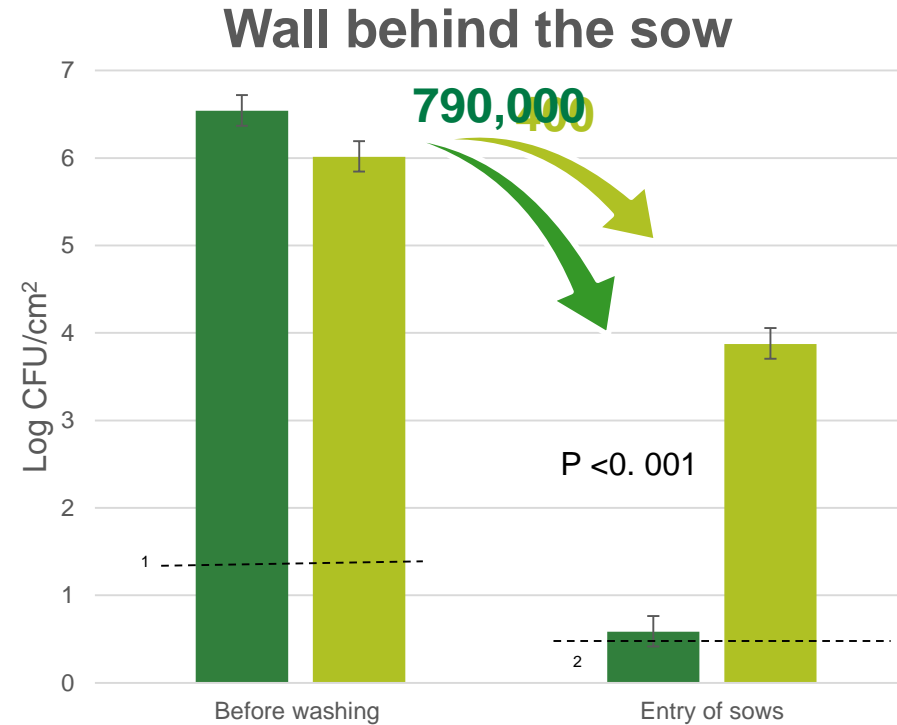
- 1) Before washing (pens containing organic matter)
- 2) After disinfectant application (2 hrs)
- 3) 24 h after disinfectant application
- 4) 72 h after disinfectant application
- 5) After drying / as sows enter farrowing crates

Results - Total Bacterial Counts



¹ Detection limit for floor area behind sow before washing (1.4 Log CFU/cm²)

² Detection limit for floor area behind sow after washing (0.4 Log CFU/cm²)

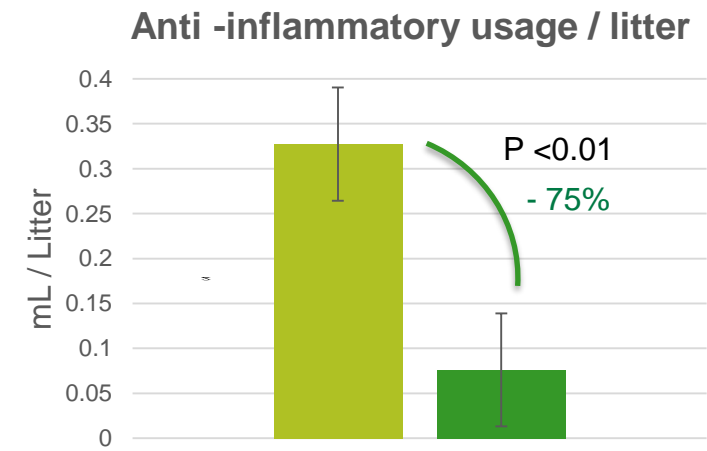
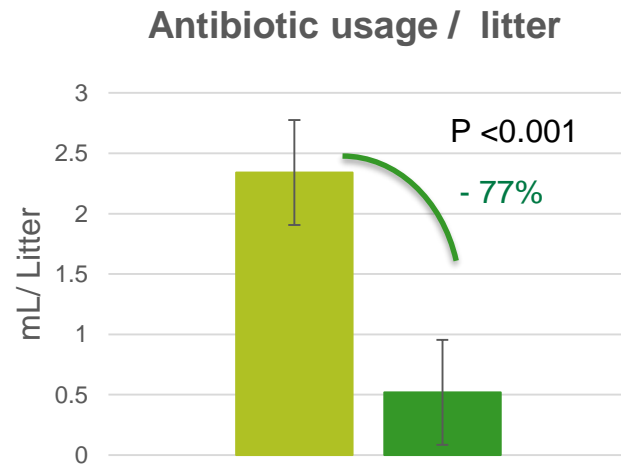
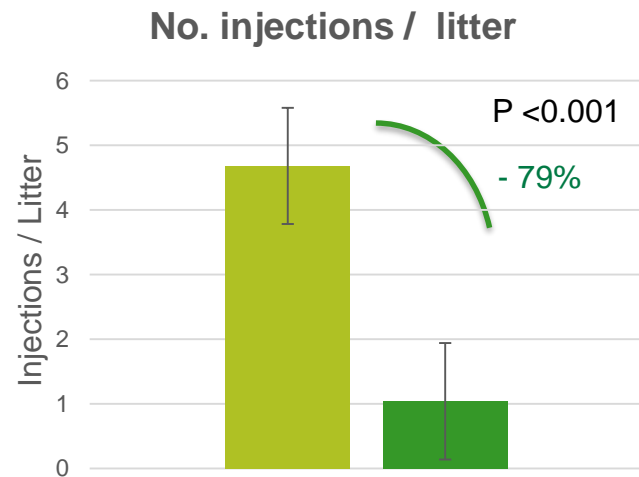
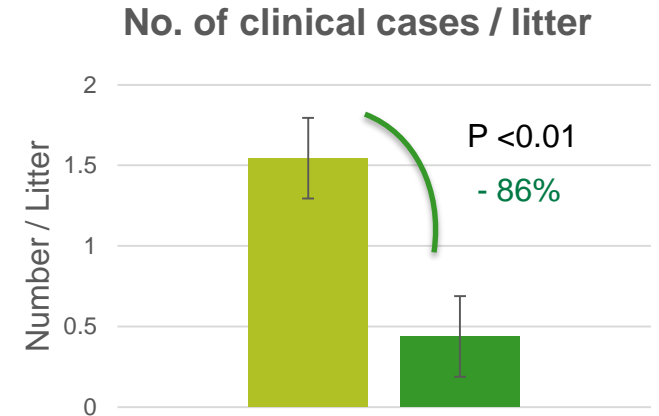
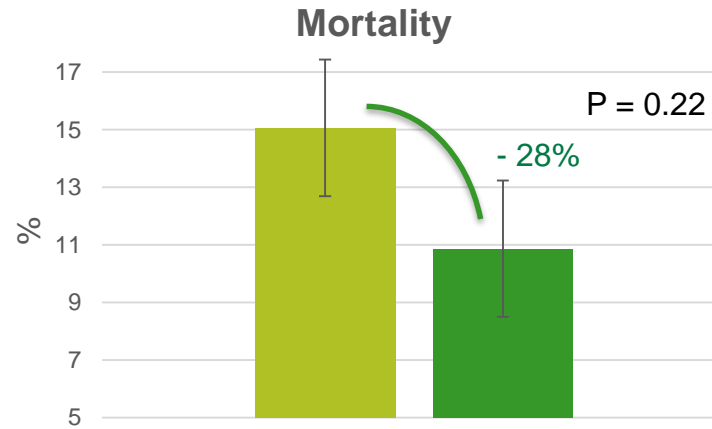
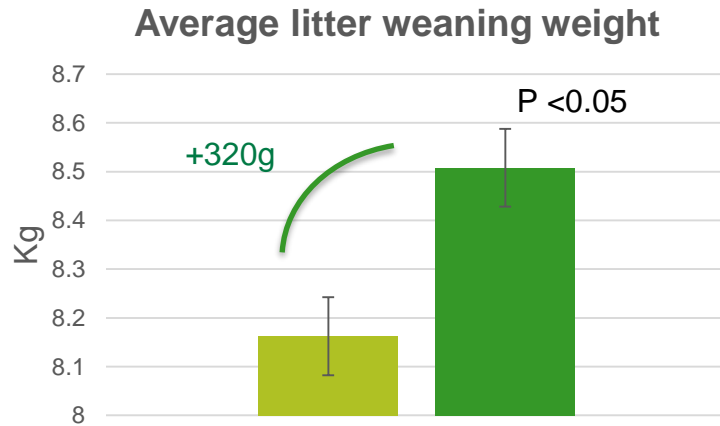
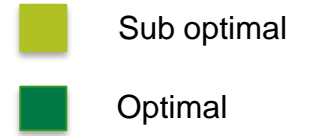


¹ Detection limit for wall behind the sow before washing (1.4 Log CFU/cm²)

² Detection limit for wall behind the sow after washing (0.4 Log CFU/cm²)

Results

Pre-weaning pig growth performance and therapeutic treatments



Implications

- Requires ↑ labour and ↑ time
 - Optimal; 32 min per pen, 4 steps, 6 days drying (3 days drying is sufficient)
 - Sub-optimal; 23.5 min per pen, 2 steps, overnight drying.
- Requires sufficient farrowing accommodation to implement properly
- Sub-optimal may seem basic
 - Compared to sanitisation regime in Moorepark at the time, yielded similar results
 - Representative of commercial sanitisation regimes
- **A little more time and effort yields dramatic benefits in terms of reducing medication usage and increasing piglet growth**



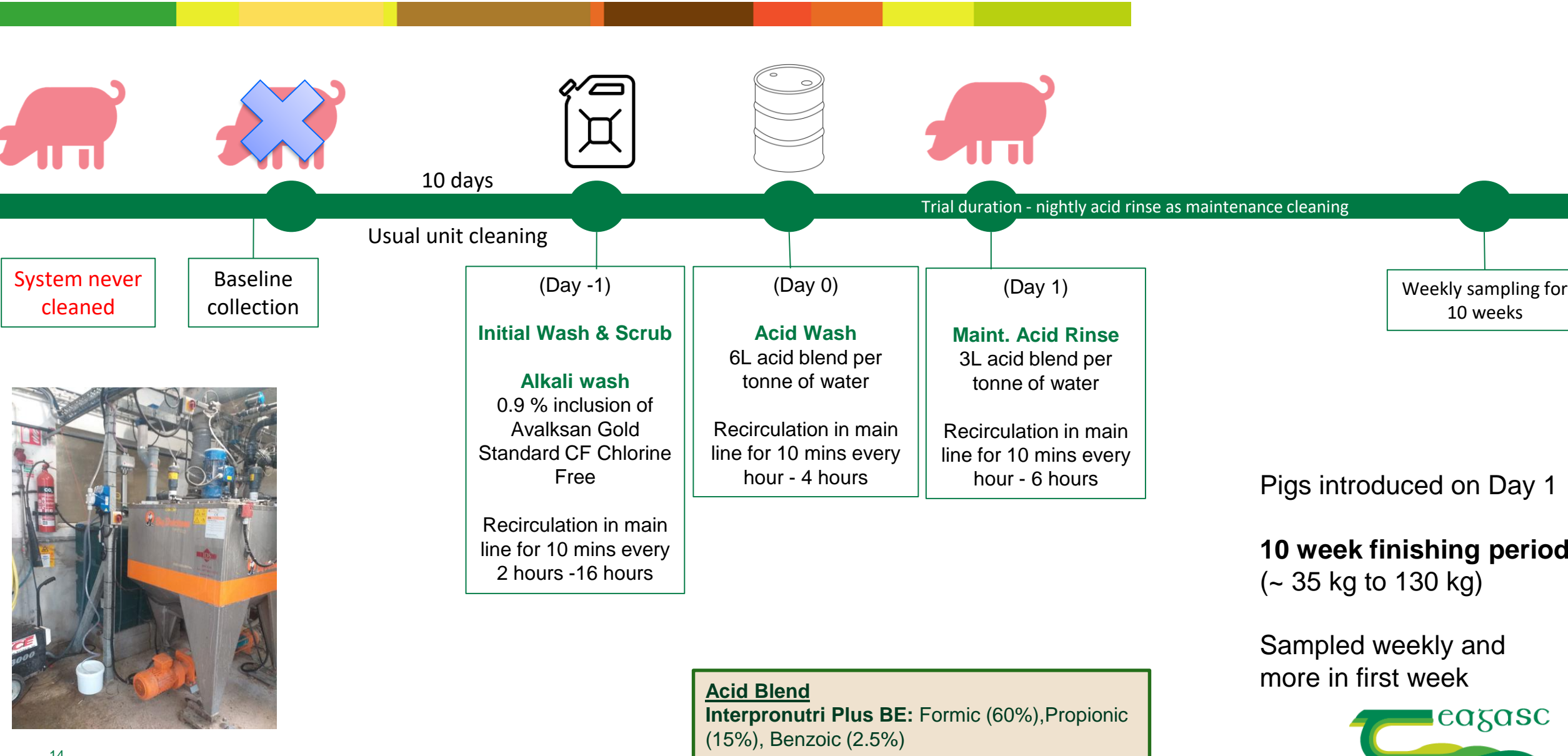
2. Liquid Feeding System Hygiene



Introduction

- No *standard* protocol to optimise liquid feeding system hygiene
- **Poor hygiene:** proliferation of undesirable bacteria and fungi
 - Loss of energy and amino acids from the feed
 - Poorer Feed Efficiency and potentially reduced growth
- **Objective:** Test a practical & easy to apply feeding system sanitisation protocol
 - ✓ Remove/disrupt biofilms in the pipes and mixing tank
 - ✓ Suppress *Enterobacteriaceae* and yeast & mould growth in liquid feed
- **Combination of an alkali wash followed by an acid rinse**

Liquid Feeding System Hygiene Protocol



Liquid Feeding System Hygiene Protocol

Day -1

Physical cleaning (wash & scrub)



Wash balls and exhaust pipe

Before cleaning



Before cleaning



After cleaning



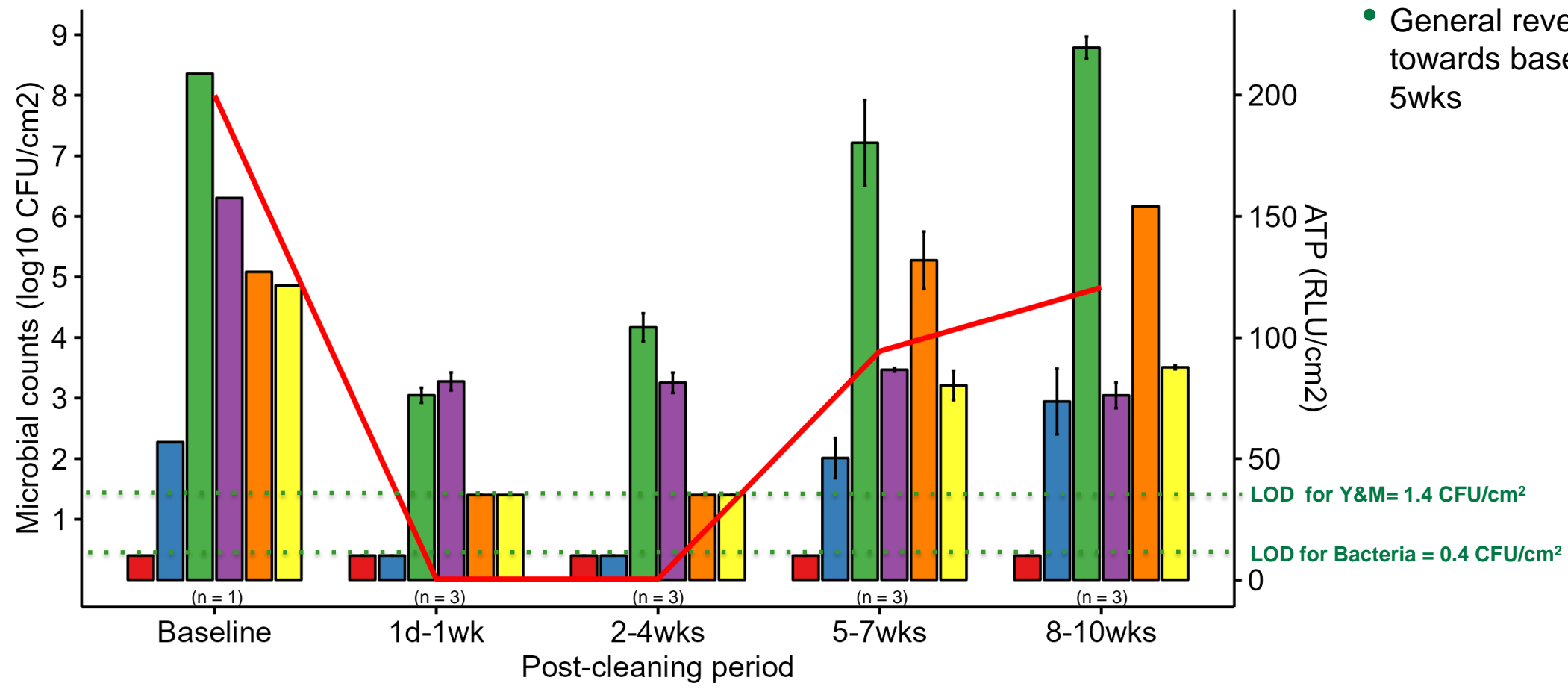
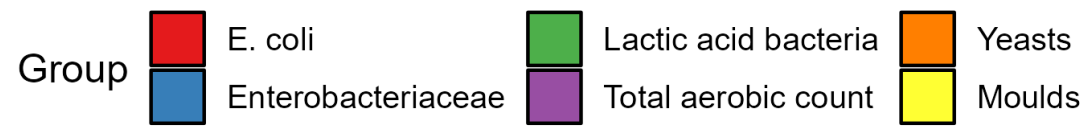
Mixing tank lid

After cleaning



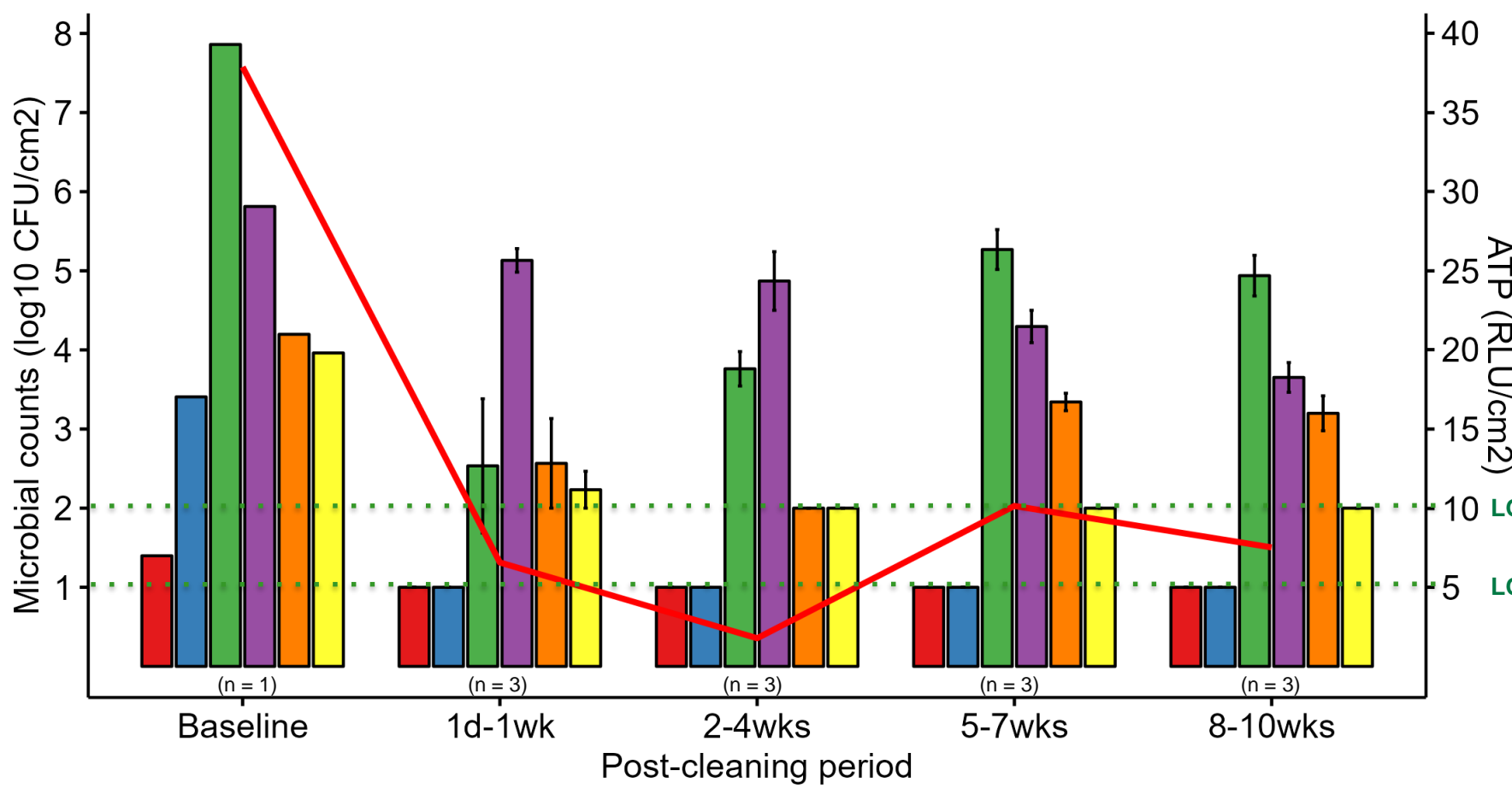
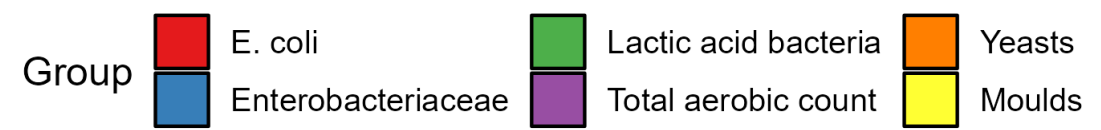
Mixing tank scrubbed and power washed

Results: Mix tank swab



- *Enterobacteriaceae*, yeast & moulds undetectable for 4 wks
- General reversion towards baseline levels after 5wks

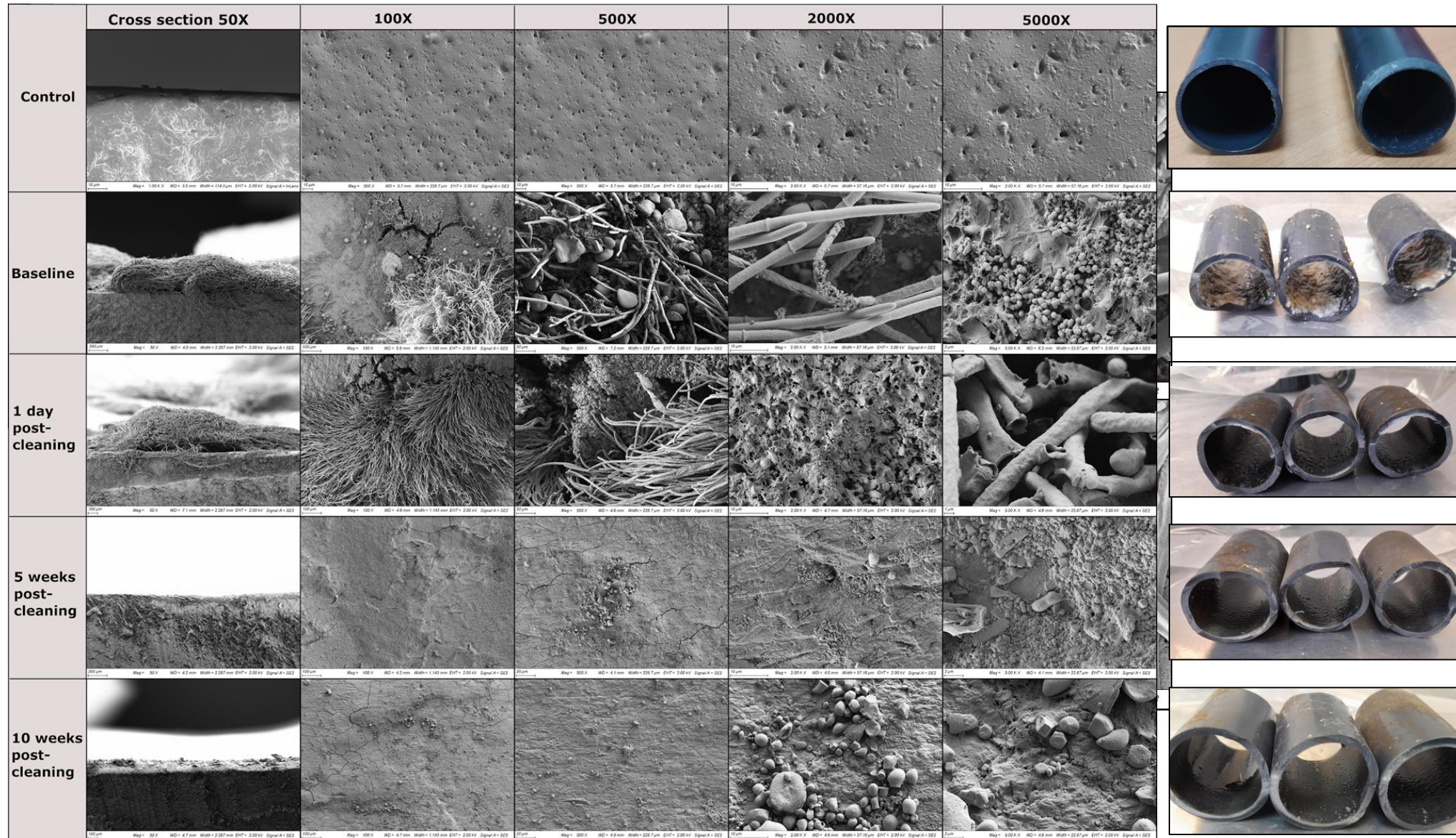
Results: Pipe swab



- *Enterobacteriaceae* & *E. coli* undetectable for 10wks
- Yeast & moulds undetectable at 3d
- Moulds undetectable for 10wks
- Yeast returned after 5wks
- ATP = good hygiene indicator

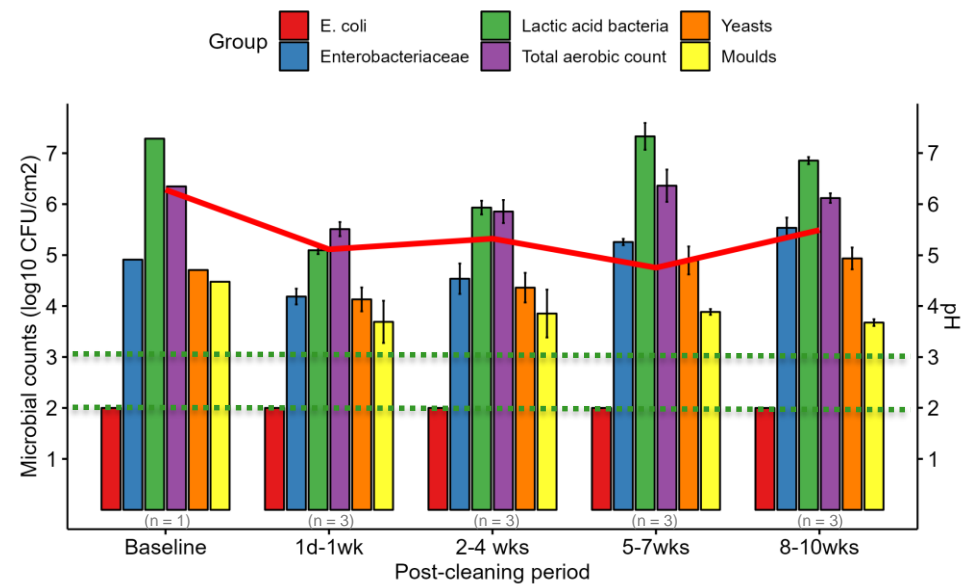
LOD for Y&M = 2 CFU/cm²
 LOD for bacteria = 1 CFU/cm²

Results: Scanning electron microscopy

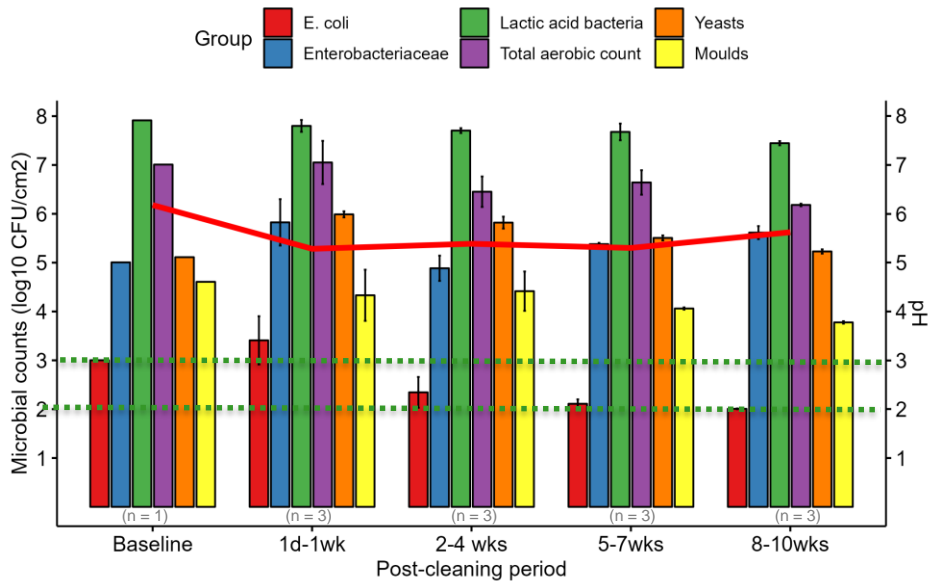


Results

Mix tank feed

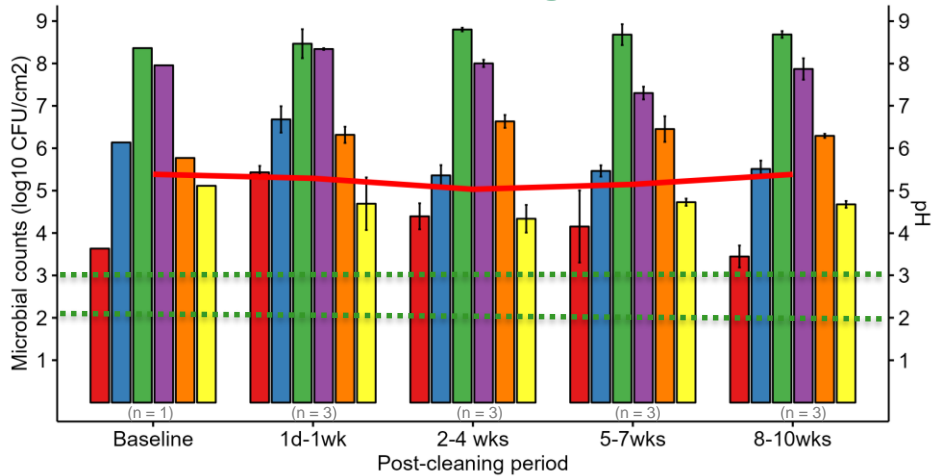


Fresh trough feed



LOD for Y&M= 3 CFU/g
LOD for Bacteria= 2 CFU/cm2

Residual trough feed



LOD for Y&M= 3 CFU/g
LOD for Bacteria= 2 CFU/cm2

- Feed-associated microbes proliferate in feed despite improved system hygiene
- Should we be surprised?
- ADFI: 2,854 g/d; ADG: 1,216 g/d; FCE: 2.35



Conclusions & Implications

- Improved hygiene of mixing tank and pipes
 - Opportunity to control/reduce re-colonisation of system
- Pipe biofilm not completely removed but ↓ *E. coli*, *Enterobacteriaceae* & moulds
 - Implications for pathogen presence & mycotoxin production
- Little impact of cleaning on feed microbial composition
 - Focus on feed! Acidify feed / use of homofermentative inoculants
 - Control/reduce microbial load of feed + good water quality
 - Good system hygiene will prevent recolonization of feed mix

Acknowledgements - PigNutriStrat

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Acknowledgments –WetFeed-2

Partners

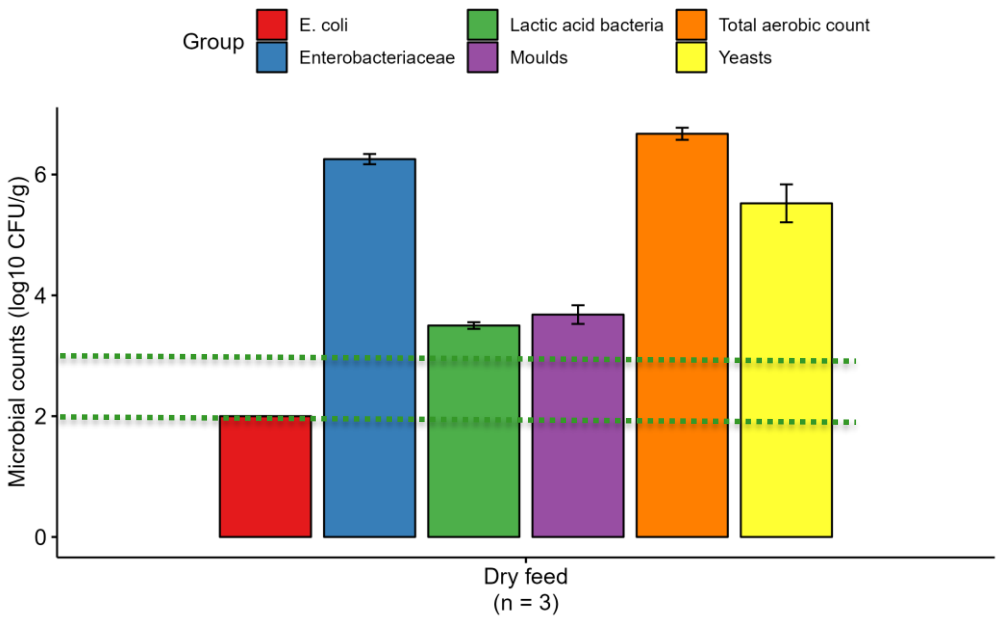


Funders

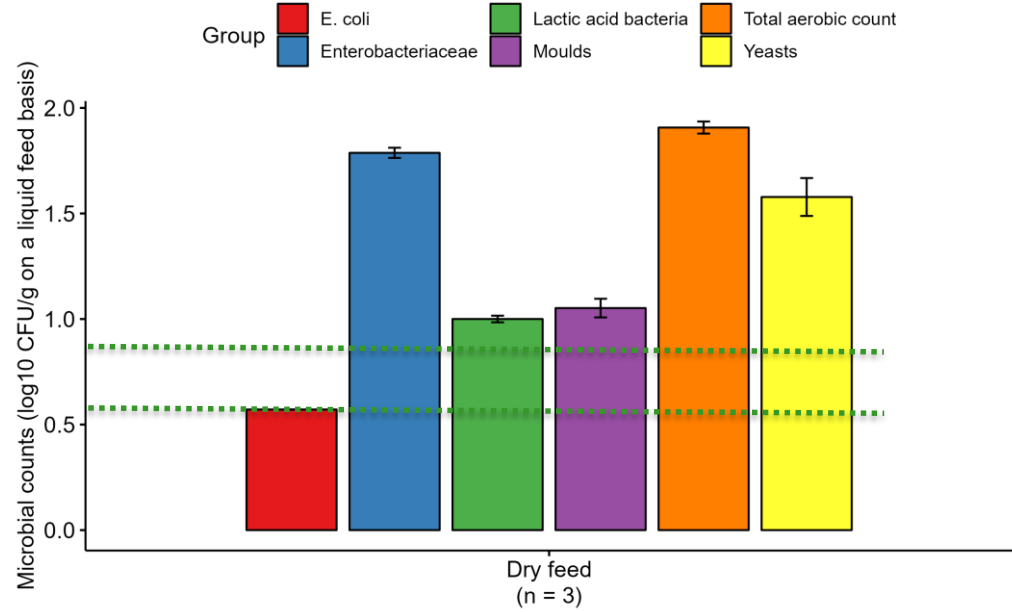


Results

Dry feed



Dry feed on a liquid feed basis



Aerobic colony count of water

