

Teagasc Pig Open Day 2023

Teagasc Moorepark, Fermoy, Co. Cork. Tuesday May 9th, 2023

Ballyhaise Agricultural College, Ballyhaise, Co. Cavan. Thursday May 11th, 2023



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Booklet compiled and Edited by Drs Keelin O'Driscoll and Amy Quinn



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Foreward

From all at the Teagasc Pig Department

We are delighted to welcome you to the first Teagasc Pig Research Open Day! It's been 3.5 years since the last 'In person' research event hosted by the Teagasc Pig Development Department and we really look forward to catching up with all stakeholders. The Open Day format has been carefully designed to maximise engagement with stakeholders, hopefully making it easier for you to learn about our research, and interact directly with our team!

We are highly aware of the incredibly difficult 18 months that the pig industry has endured, a hugely challenging period, with escalating feed and energy costs that until recently were not matched by concurrent rises in pig price. Many of the research projects that we are showcasing were designed to help assist with these issues. There has been a significant research focus on management and nutritional strategies that help to promote young pig performance and survival, from provision of supplementary feed, to investigating whether simply improving your hygiene regimen can improve health, and consequently growth rate. We also have a focus on liquid feeding systems, again looking at both how to optimise pig feeding, but also the hygiene of the system.

As well as researching options to help improve profitability using current systems, we have also kept an eye on emerging issues that could impact the way pigs are managed on farm. Our stand on 'Managing the Pig's Environment' covers several areas that were a focus of a recent EFSA report; namely reducing stress on gestating sows, provision of appropriate enrichment for weaned pigs, and reducing stocking densities and feeder competition.

This event also provides an excellent opportunity to share with you the progress that has been made in the construction of our new 'low – emissions', 'high – welfare' finisher house in the Teagasc Pig Research Facility. This new building is one of the first of its kind in Ireland, and promises to provide the research capability to conduct research into the environmental and societal challenges facing the pig industry.

Finally, as well as sharing our research with you, we would also really like to hear your thoughts. During the day there will be several possibilities for you to share your opinion about the main industry challenges, and which areas you think need research focus.

We look forward to meeting you, and hope that you enjoy the day.

Managing The Pig Environment

Improving gestation housing for sows benefits piglets



Rationale: We know what pregnant sows need & there are relatively easy ways of improving comfort & complexity of gestation housing systems to benefit them. Do these benefits mean better reproductive performance & more resilient piglets?

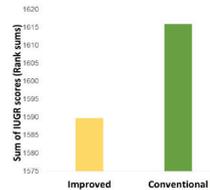
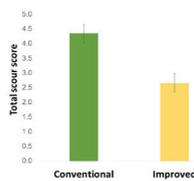
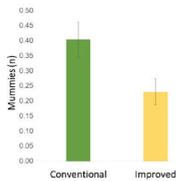
Research:

On a commercial farm we installed rubber mats & natural fibre ropes in the feeding stalls & straw filled racks in the loose area

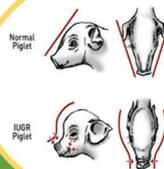


Findings:

- ↑ sow welfare (↓ oral stereotypies, ↓ inflammatory markers, i.e. less stress)
- ↓ mummies ↑ piglets weights ↓ IUGR scores & ↓ scouring



Conclusion: Improving gestation housing environment benefits sow welfare & means that they produce healthier/more resilient piglets. These findings have important implications in an era of minimal antibiotic use & zero zinc



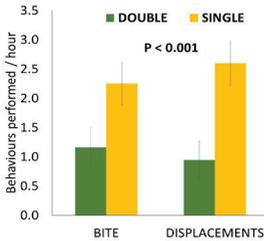
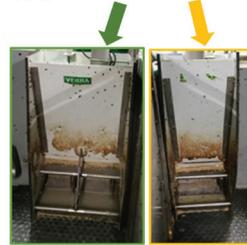
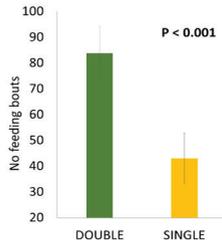
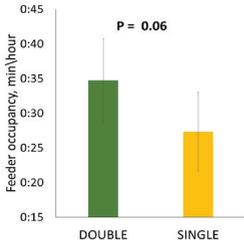
Contact: Laura Boyle — laura.boyle@teagasc.ie

More Feeder Space = Better Performance & Welfare



Rationale: Excessive competition at the feeder causes ↓ performance & ↑ damaging behaviour

Research: We compared performance & welfare using a feeder-space/pig ratio of 1:6 or 1:12



| | Double | Single | P-value |
|-----------|---------------|---------------|---------|
| ADG, g/d | 0.782 ± 0.013 | 0.759 ± 0.013 | 0.229 |
| ADFI, g/d | 1.54 ± 0.03 | 1.53 ± 0.03 | 0.915 |
| FCR, g/g | 1.85 ± 0.02 | 1.91 ± 0.02 | 0.015 |

Increasing feeder space / pig:



↑ feeding bouts, ↓ aggression, ↓ FCR, ↑ pig welfare



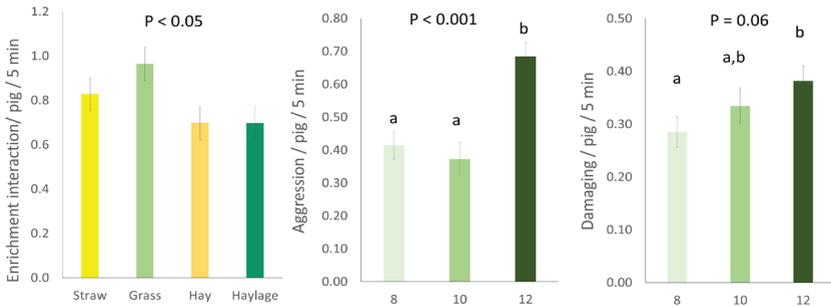
Contact: Keelin O'Driscoll — keelin.odriscoll@teagasc.ie

Long tails need lower stocking density & good enrichment

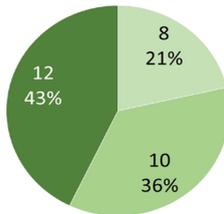
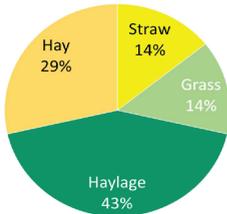


Rationale: High stocking density & lack of optimal enrichment are risks for tail biting
 Straw: “Gold standard” not readily available; Stocking densities ↓ in countries not docking

Methods: Hay, Haylage and Grass compared to Straw / 8 vs. 10 vs. 12 undocked pigs/pen



Tail Biting Outbreaks



Take home message:
 Higher stocking densities and less appealing materials associated with more tail biting outbreaks



Contact: Keelin O’Driscoll — keelin.odriscoll@teagasc.ie

Managing Disease

Ear necrosis reflects stress for pigs during rearing

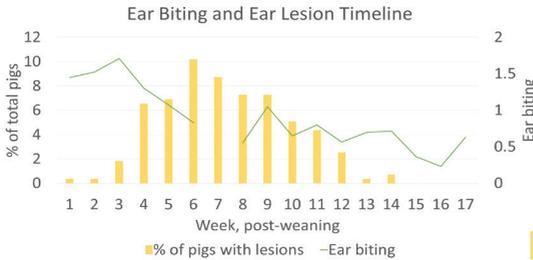


Rationale: Ear necrosis is a prevalent, unsightly & painful disease in weaner pigs. Little is known about it (risk factors, causes, mitigation strategies), however it is believed to be multifactorial

Research: Measured ear biting behaviour & ear necrosis in weaner pigs across several trials in Moorepark herd since February 2022 to understand risk factors

Main findings:

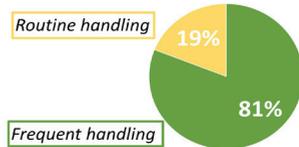
1. Ear biting ↑ the risk of ear necrosis



% pigs with ear lesions

2. Stress (e.g. frequent handling pre-weaning & mixing at weaning) ↑ the risk of ear necrosis

3. Offspring of gilts are more likely to develop ear necrosis



Conclusion: Intrinsic (e.g. sow parity) & extrinsic (i.e. stress causing) factors that compromise immunity in the pig are risks for ear necrosis likely mediated by ear biting.



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Reducing MRSA in pigs

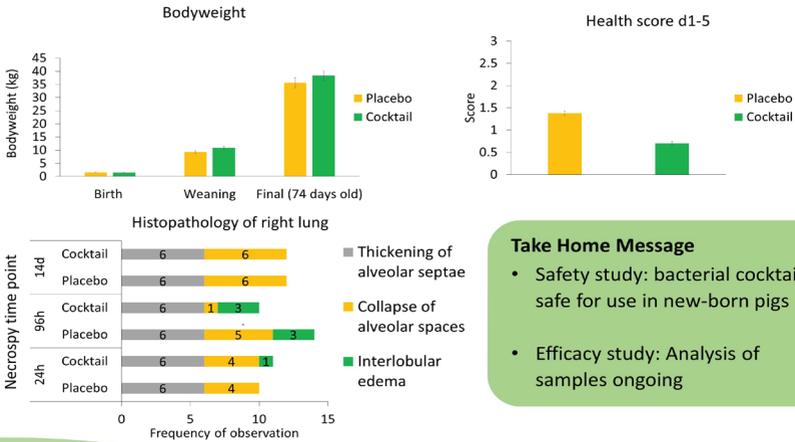


Rationale: Methicillin-resistant *Staphylococcus aureus* (MRSA) can be transmitted between pigs and humans. Nasal application of anti-MRSA bacterial strains could reduce MRSA in pigs.

Research:

1. Three *Lactococcus lactis* strains with anti-MRSA activity selected from pig nasal swabs
2. This bacterial cocktail applied to nostrils of new-born piglets to examine safety
3. Efficacy was tested in Moorepark & on 2 commercial farms

Safety: Bacterial cocktail did not impact growth, improved health scores & indicators of lung health



Take Home Message

- Safety study: bacterial cocktail is safe for use in new-born pigs
- Efficacy study: Analysis of samples ongoing



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Probiotic Sow Feed Additive



Rationale:

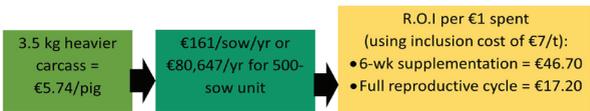
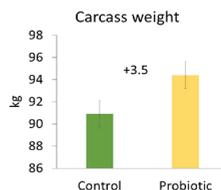
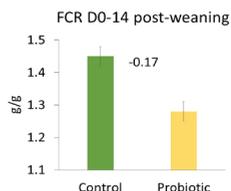
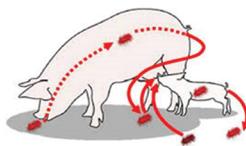
- Administration of a probiotic to sows could improve growth & health of offspring in the absence of antibiotics & ZnO

Research:

- Seaweed-derived probiotic supplemented to sows for the last 2 weeks of gestation & 28 days of lactation
- Offspring followed to slaughter

Findings:

- Pre-weaning: Mortality reduced by 5.5% & colostrum protein content increased by 2.3%
- Post-weaning: Improved FCR d0-14 associated with improved intestinal morphology
- Finishing period: Increased carcass weight at slaughter



Take-home messages:

- Only probiotic with lifetime growth benefits in offspring of supplemented sows
- Improved feed efficiency post-weaning & increased carcass weight
- Technologically robust & stable in dried form & in feed



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Improving Pre- and Post-Weaning Management And Nutrition

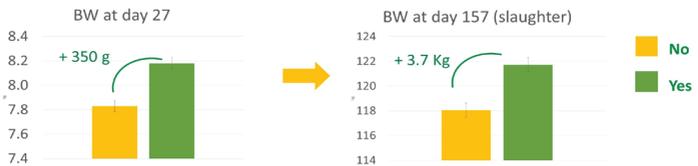
Post-partum pain relief provision to sows



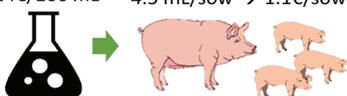
Rationale: Reducing pain experienced by sows after farrowing could increase nursing ability & colostrum intake by smaller pigs, increasing pig growth & reducing antibiotic usage

Method: Injected IM with Loxicom® LA injection (Norbrook® Laboratories Ltd) ~ 0.4 mg/kg ~birth of last piglet

Findings:



- Increased colostrum intake → reduction in antibiotic & anti-inflammatory usage in pigs
- Carcass weight increased by 2.8 kg

| | |
|--|---|
| <p>Costs</p> <p>24€/100 mL</p> <p>1 injection 4.5 mL/sow → 1.1€/sow</p>  | <p>Benefits</p> <p>@ 2.08 € /kg of DW</p> <p>Meloxicam: + 2.8 kg DW/pig = 5.82 € /pig sold</p> <p>@27 pigs/sow/yr = €157 /sow/yr</p> |
| <p>ROI 62:1</p> | |

Recommendation:
Provide meloxicam to sow as soon as possible on delivery of placenta



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Benefits of split-suckling?



Rationale: Split-suckling should allow greater colostrum intake by smaller pigs, thereby increasing growth & reducing the need for antibiotic usage

Research: Split suckling applied whereby heaviest piglets (6) removed for 1 h & repeated once more after 1.5 h

Findings:



- Reduction in carcass weight
- No effect on medication usage & no effect on average colostrum intake

Recommendation: Based on our protocol for split-suckling, the practice is not recommended

- Split-suckling must be down within 24 h post-farrowing to ensure colostrum intake
- Choose a different removal method?
 - Remove piglets based on birth order (if long farrowing process)?
 - Remove piglets with a “full” belly?
- Remove a subset of piglets for 1-2 h maximum?
- Don’t repeat split-suckling several times on the same litter?



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Liquid supplementation of suckling piglets



Rationale: Creep feeding is common but intake is low & variable. Providing liquid milk and/or liquid starter diet should increase pre-weaning creep feed intake & growth.

Research:

Study 1: Compared dry vs liquid creep feeding strategies.

Study 2: Mixture of milk + liquid starter diet provided in high & low sanitary environments.

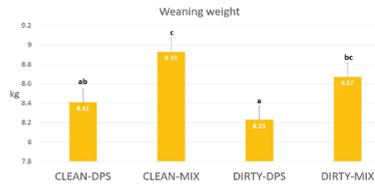
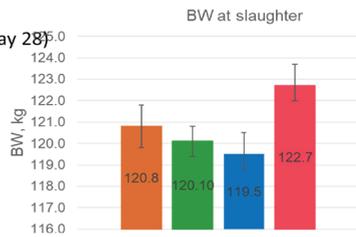
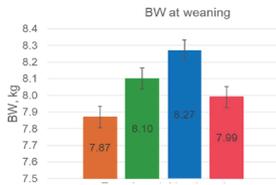
Study 1:

Control: Sow milk only

Dry pelleted starter diet (DPS): day 10 until weaning (day 28)

Liquid Milk: day 3 until weaning

Liquid milk + starter mixture: day 3 until weaning



Study 2:

DPS in high sanitary environment (CLEAN)

DPS in low sanitary environment (DIRTY)

Liquid milk + starter mixture in CLEAN

Liquid milk + starter mixture in DIRTY

Recommendation:

Mixture of liquid milk & starter diet increases weaning weight
Benefit of liquid feeding is greatest in a high sanitary environment



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Liquid supplementation of newly weaned piglets



Rationale: Short-term provision of liquid feed/milk in the first days post-weaning should improve feed intake, intestinal structure & function resulting in increased growth.

Research:

Study 1: newly weaned pigs supplemented with liquid milk or liquid starter diet.

Study 2: newly weaned pigs supplemented with glutamine fortified supplemental milk.

Study 1

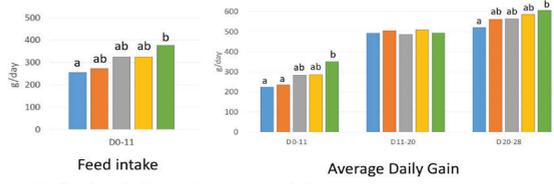
Dry pelleted starter diet (DPS)

DPS + liquid starter for 4 days

DPS + milk replacer for 4 days

DPS + liquid starter for 11 days

DPS + milk replacer for 11 days



- Supplemental milk increased jejunal villus height by 37% & increased digestive enzyme activity

Study 2

Dry pelleted starter diet (DPS)

DPS + milk replacer for 11 days

DPS + 1% glutamine

DPS + milk replacer for 11 days + 1% glutamine



- Supplemental milk increased early post-weaning feed intake & growth & increased slaughter weight by ~ 3kg
- Glutamine had no effect

Recommendation: Feeding supplemental milk for 11 days post-weaning can increase feed intake & lifetime growth



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Grower / Finisher Management And Feeding

Optimising liquid feeding management



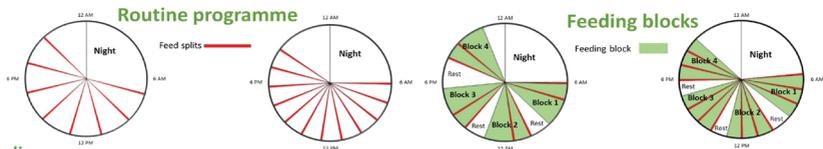
Rationale: Sensor position, number of feed splits per day & feeding programme can be adjusted to improve liquid feeding management in order to improve feed efficiency

Experiment 1: Optimum combination of sensor position in trough & number of feed splits/day

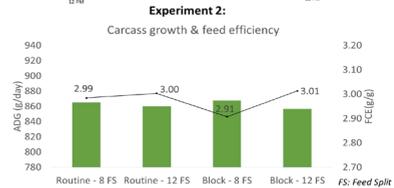
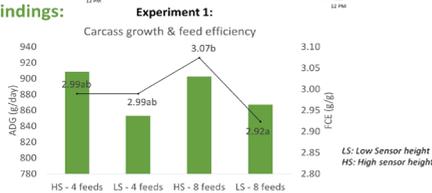
→ Sensor height in the trough: low (15mm) or high (50mm)

→ Number of feed splits per day: 4 or 8

Experiment 2: Optimum number of feed splits per day & feeding blocks



Findings:



Sensor height in the trough is the main factor influencing feed efficiency

No benefit from using the feeding blocks

In both experiments, no effect of the number of feed splits on feed efficiency

Recommendation:

1. Sensor position: favour **low sensor height**
2. Number of feed splits per day: favour **8 or greater**



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Liquid feeding system hygiene



Rationale: Poor liquid feeding system hygiene contributes to spontaneous fermentation in liquid feed. Optimising system hygiene should improve microbial & nutritional quality of liquid feed & improve FCE

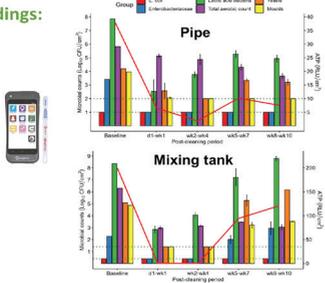
Sanitisation programme:

- 1) Physical cleaning of system;
- 2) Alkali (caustic) detergent & initial acid wash;
- 3) Nightly acid rinse



Acid blend
 Formic acid - 60%
 Propionic acid - 15%
 Benzoic acid - 2.5%

Findings:



Cost benefit summary for first 5 yrs:

| | Batch size (no. pigs) | | |
|---------------------------------|-----------------------|--------|--------|
| | 1,000 | 5,000 | 10,000 |
| + Feed saving/yr (€/yr) | 5,390 | 26,948 | 53,896 |
| - Total cost of cleaning (€/yr) | 420 | 2,100 | 4,200 |
| - ↑ Labour cost (€/yr) | 401 | 401 | 401 |
| - Repayments/yr (5 yr loan; €) | 1,077 | 1,077 | 1,077 |
| Margin over ↑ cost (€/yr) | 3,491 | 23,369 | 48,217 |
| ↑ Margin per pig (€/pig) | 0.87 | 1.16 | 1.20 |

- Liquid feed FCE = ~0.20 unit poorer
- Assumed 0.05 FCE improvement (30-115 kg)
- 4 batches/year

Conclusion: Sanitisation programme improved the hygiene of liquid feeding system, but not the liquid feed - likely due to the high microbial content already present in the dry feed

Take-home message:

To improve liquid feed quality & FCE, a sanitisation programme should be combined with other strategies such as dietary acidification with organic acids or microbial inoculants



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Meeting Sustainability Challenges

High welfare pig production systems using a One Welfare framework

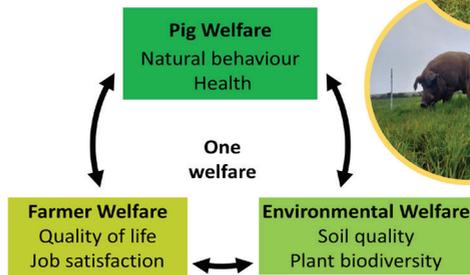


Rationale: Societal expectations of good welfare in pig production systems. Outdoor pig production could partially meet these demands as well as providing ecosystem services & an opportunity to diversify income streams. Indoor (conventional) pig producers could capitalise on opportunities for premiums for high welfare pigmeat

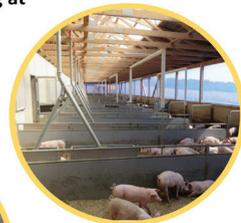
Research:

1. **Characterise outdoor systems** through an online survey (no. answers per county) & farm visits (Feb to May 2023)

Develop biosecurity tool for outdoor systems of pig production



2. **Improve pig welfare in conventional farming systems** (pig units in Moorepark & AFBI NI) & develop alternative systems : **new building at Moorepark**
3. **Develop a roadmap** in participation with stakeholders to help the pig industry transition to **higher welfare production systems**



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Strategies to Reduce Ammonia Gas Emissions in Irish Pig Farms



Rationale: Ireland has committed to target ammonia reductions of 1% & 5% by 2020 & 2030 respectively, 91% of ammonia (NH₃) is generated from slurry (storage & spreading) & chemical fertilisers, Pig production in Ireland is responsible for 6.4% production of ammonia.

Research:

LOW EMISSION (LE) PROJECT

- Over the next four years, PROJECT LE FARMS will investigate the following strategies for lowering Irish pig farms' ammonia emissions:
 - Examine Crude Protein of feed & feed additives,
 - Assess New Technologies,
 - Evaluate New LE Facility for NH₃ production & its economic viability,
 - Creating Model (AERMOD) to compare NH₃ Emissions.

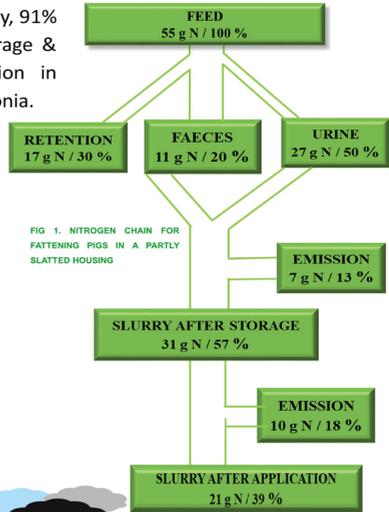
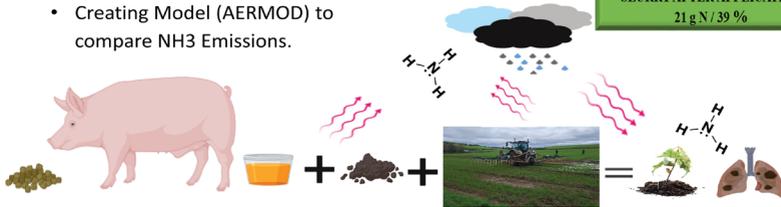


FIG 1. NITROGEN CHAIN FOR FATTENING PIGS IN A PARTLY SLATTED HOUSING



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Funding & Collaborators

Funding & Collaborators



monoguthealth
Optimal gut function in monogastric livestock



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Notes

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AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY