RESEARCH SUMMARY

Evaluating the in vitro *efficacy of FeedARMOR™ against* Salmonella *Typhimurium.*

FEED**ARMOR**™

BACKGROUND

FeedARMOR is a next-generation feed mitigant that was shown in an ice-cube challenge model demonstrated by Dr. Scott Dee to protect sows from feed contaminated with Porcine Reproductive and Respiratory Syndrome Virus (PRRSV), Porcine Epidemic Diarrhea Virus (PEDV) and Seneca Valley Virus (SVA) as compared to a negative control feed without mitigation, where all sows became sick. Furthermore, in this trial, 2 lbs per ton of FeedARMOR gave the same level of protection as 6.5 lbs per ton of a liquid formaldehyde product. To further develop our understanding of how FeedARMOR works, we are continuing to work with both viruses and bacteria.

Salmonella is a highly contagious bacterial pathogen often found in animal feed that causes enteric disease in livestock and poses a significant risk to human health. Dr. Janghan Choi established an *in vitro* model to test antimicrobial activity of feed mitigants against *Salmonella* Typhimurium. In this model, minimum inhibitory concentration (MIC) of tested feed mitigant are determined using microdilution methods, and bacterial counts of *Salmonella* Typhimurium are quantified at its sub-MIC concentration.

FeedARMOR was evaluated using this *in vitro* system to investigate its antimicrobial activity against *Salmonella* Typhimurium.

EXPERIMENTAL DESIGN[1]

- Trials were conducted, and data were generated by the JC Laboratory, Department of Animal and Food Sciences, Texas Tech University
- This was an *in vitro* experiment in which a standardized bacterial inoculum (5×10^5 CFU/mL) was added to the test solution, followed by different concentrations of FeedARMOR
- Minimum inhibitory concentration (MIC) was determined by microdilution against *Salmonella* Typhimurium using OD_{600} measurements and bacterial counts
- Minimum bactericidal concentration (MBC) was determined using an agar plating method
- Bacterial growth at sub-MIC levels was evaluated

TREATMENTS

1. Control: 5×10^5 CFU/mL of *Salmonella* Typhimurium without FeedARMOR
2. Control + FeedARMOR (0.5 mg/mL)
3. Control + FeedARMOR (1.0 mg/mL)
4. Control + FeedARMOR (1.5 mg/mL)
5. Control + FeedARMOR (2.0 mg/mL)
6. Control + FeedARMOR (2.5 mg/mL)
7. Control + FeedARMOR (3.0 mg/mL)
8. Control + FeedARMOR (3.5 mg/mL)
9. Control + FeedARMOR (4.0 mg/mL)
10. Control + FeedARMOR (4.5 mg/mL)
11. Control + FeedARMOR (5.0 mg/mL)

FIGURE 1.
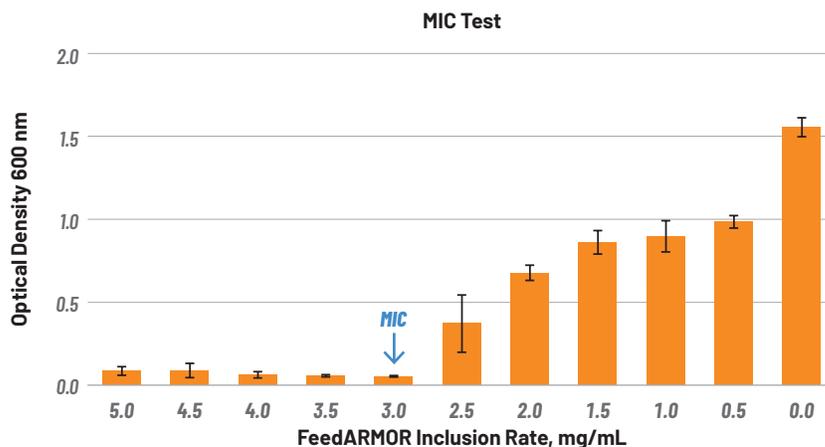Minimum inhibitory concentration (MIC) determination (N = 3).

FIGURE 2.
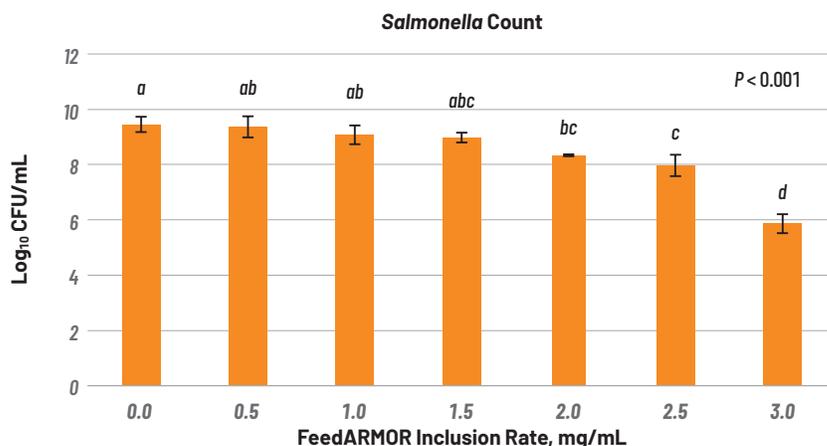*Salmonella* Typhimurium count at sub-MIC levels (N = 3).

Salmonella Count

Log₁₀ CFU/mL vs FeedARMOR Inclusion Rate, mg/mL

$P < 0.001$

Bars labeled: 0.0 (*a*), 0.5 (*ab*), 1.0 (*ab*), 1.5 (*abc*), 2.0 (*bc*), 2.5 (*c*), 3.0 (*d*)

TABLE 1.
Minimum bactericidal concentration (MBC) determination (N = 3).

FEEDARMOR INCLUSION RATE, MG/ML	GROWTH OF BACTERIA
3.0 (MIC*)	Detect
3.5	Detect
4.0 (MBC**)	No Detect
4.5	No Detect
5.0	No Detect

*Minimum inhibitory concentration (MIC): the lowest concentration of FeedARMOR that visibly inhibits bacterial growth

**Minimum bactericidal concentration (MBC): the lowest concentration of FeedARMOR that results in no detectable viable bacteria

RESEARCH SUMMARY

FeedARMOR exhibits strong antimicrobial activity against a major bacterial contaminant in animal feed, *Salmonella* Typhimurium

- Minimum inhibitory concentration (MIC, 3.0 mg/mL FeedARMOR): inhibited growth of *Salmonella* Typhimurium, achieving a 3 log₁₀ (≈99.9%) reduction in bacterial counts
- Minimum bactericidal concentration (MBC, 4.0 mg/mL FeedARMOR): no viable *Salmonella* detected
- These results suggest that FeedARMOR may effectively reduce or eliminate *Salmonella* Typhimurium contamination in animal feed

— ADDITIONAL FeedARMOR TRIAL DATA AVAILABLE UPON REQUEST —

FEEDARMOR™

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