

Dual Defender® Reduced Risk of Infection Following Consumption of Virally Contaminated Feed

Summary Report by Dr. Jessica Fox, Director of Veterinary Services & Biosecurity, based on original research by Dee et al¹

A research study was conducted at Pipestone Applied Research, Pipestone Veterinary Services, certified biosafety level 2 applied research building to evaluate the merit of various feed additives for mitigating the risk of virus contaminated feed. **Dual Defender®** is a proprietary feed additive that contains a patent-pending blend of phytonutrients including a natural oregano **Microfused® Essential Oil**, and **Actifibe®** Prebiotic. The results of this research were published in the peer reviewed journal, *Transboundary & Emerging Diseases*, July 2020¹ and key findings are summarized here.

RESEARCH SUMMARY

Under the conditions of this study, adding **Dual Defender**, to a standard commercial diet fed to pigs for 10 days and then challenged with several viruses using an ice block challenge model in the feed, increased weight gain and prevented clinical signs of disease and mortality when compared to positive control pigs.

BACKGROUND

Biosecurity procedures are essential for protecting U.S. swine herds from harmful disease agents. In recent years, the swine industry has enhanced biosecurity measures in response to PED and PRRS virus outbreaks. These measures included worker showers, air filtration and negative air pressure barn doors, protective clothing, boot covers, and truck washes.² Research has demonstrated that feed is a potential vehicle for transmission of viral diseases that has not been adequately addressed in most biosecurity programs. Astonishingly, one gram of PED contaminated pig feces has enough viral particles to result in 500 tons of potentially infectious feed.³ As other viral threats such as African Swine Fever arise, it is essential that producers identify any remaining gaps in their biosecurity programs. Feed biosecurity should be considered an essential component of these programs and risk mitigation through additives is one step producers can take to safeguard their feed and defend their herds.

MATERIALS AND METHODS

Animals

Weaned pigs were obtained from PRRSV, PEDV and SVA negative herds and allocated equally to treatment rooms. Each room contained 96 pigs divided into six pens (16 pigs per pen). Treatment rooms were fed complete feed supplemented with a specific feed additive, in this case **Dual Defender**, while the positive control room animals were fed complete feed with no supplementation.

Trial Design

This trial was conducted at Pipestone Applied Research, Pipestone Veterinary Services, certified biosafety level 2 applied research facility. The pigs were fed the



treated or control diets for a 10-day pre-challenge period. This was followed by a 15-day post-challenge period to measure response.

The feed was purposefully contaminated on day 0 and 6 of the post-challenge period by dropping an ice block containing known amounts of PEDV, PRRSV-174 and SVA viruses into the feed bin. On day 15 post-challenge, the experiment was terminated.

Throughout the study, animals were monitored for clinical signs of disease including diarrhea (PEDV), lameness (SVA) or dyspnea (PRRSV). On days 0 and 15 post challenge, pen weights from each room were collected to determine performance. Mortalities were also recorded during the post-challenge period. On day 15 post-challenge, 30 animals from each room were selected for infection rate sampling. For determination of PRRSV infection, serum samples were collected from the 30 animals and pooled in 5 samples. For PEDV infection determination, rectal swabs were collected from each pig. For SVA infection detection, tonsil samples were collected from each pig and tested individually.

RESULTS

Clinical signs of disease, performance, mortality, and infection rate are reported here (Table 1.0) for **Dual Defender** treated pigs as well as positive control pigs.

Treatment	Clinical Scores (Disease)			Postmortem Diagnostics (Infection)			Performance	
	Diarrhea (PED)	Lameness (SVA)	Dyspnea (PRRS)	Rectal Swab (PED)	Serum (PRRS)	Tonsil (SVA)	ADG (kg)	Mortality
(+) control	100% ^b	100% ^b	100% ^b	100% ^b	100% ^b	20% ^b	0.24 ^b	6%
Dual Defender™	0%^a	0%^a	0%^a	40%^a	0%^a	0%^a	0.57^a	0%
<i>p</i> -value	.0002	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	NA

Table 1.0 Summary of clinical signs of disease, infection, and performance. (Adapted from *Dee et al.* Table 6A¹) Difference in superscripts (a/b) indicates a difference in significance of *p* < .05.

Pigs fed **Dual Defender** remained free of PRRSV-174 and SVA infection and no clinical signs were detected. Despite evidence of PEDV RNA in feces, no evidence of clinical signs of PED were observed. In addition, lower mortality (in fact, no mortality) and a significant difference in growth was observed in pigs fed **Dual Defender** as compared to the positive controls.

Under the conditions of this study, **Dual Defender** proved to be beneficial to both pig health and performance when supplemented into the feed (at a rate of 2 lbs. per ton) prior to viral challenge through the feed.

REFERENCES

1. Dee SA, Niederwerder MC, Edler R, et al. An evaluation of additives for mitigating the risk of virus-contaminated feed using an ice-block challenge model. *Transboundary and Emerging Diseases*. 2020;00:1-13. <https://doi.org/10.1111/tbed.13749>
2. Cima, Greg. U.S. Braces for African Swine Fever, Virus that kills 90 percent of pigs found in China, Eastern Europe, *Journal of the American Veterinary Medical Association*. April 2019
3. Chochrane RA, Dritz SS, Woodworth JC. Et all. Feed Mill Biosecurity Plans: A systematic approach to prevent biological pathogens in swine feed. *Journal of Swine Health and Production*. 2016;24(3):154-16