

Title: Assessing the effects of medium chain fatty acids and fat sources on PEDv by qRT-PCR and bioassay – **NPB #15-207**

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Scientific Abstract

Research has confirmed that chemical treatments, such as medium chain fatty acids (MCFA) and commercial formaldehyde, can be effective to reduce the risk of porcine epidemic diarrhea virus (PEDV) cross-contamination in feed. However, the efficacy of individual MCFA levels are unknown. The objective of this study is to compare the efficacy of commercially-available sources of MCFA and other fat sources versus a synthetic custom blend of MCFA to minimize the risk of PEDV cross-contamination as measured by qRT-PCR and bioassay. Treatments were arranged in a 17×4 plus 1 factorial with 17 chemical treatments: 1) Positive control with PEDV and no chemical treatment, 2.) 0.3% Sal CURB, 3.) 1% medium chain fatty acid blend [caproic, caprylic, and capric acids; 1:1:1] (aerosolized), 4.) 1% medium chain fatty acid blend [caproic, caprylic, and capric acids; 1:1:1] (non-aerosolized), 5.) 0.66% caproic acid, 6.) 0.66% caprylic acid, 7.) 0.66% capric acid, 8.) 0.66% lauric acid, 9.) 1% capric and lauric acid mixture (1:1 ratio), 10.) FRA C12, 11.) 1% choice white grease, 12.) 1% soy oil, 13.) 1% canola oil, 14.) 2% palm kernel oil, 15.) 1% palm kernel oil, 16.) 2% coconut oil, and 17.) 1% coconut oil; 4 analysis days of 0, 1, 3, and 7 post inoculation; and 1 treatment of PEDV negative untreated feed. Matrices were first chemically treated, then inoculated with PEDV, stored at room temperature until being analyzed by qRT-PCR. The analyzed values represent threshold cycle (CT), at which a higher CT value represents less detectable RNA. All main effects and interactions were significant ($P < 0.002$). The interaction of treatment \times day indicated that over time the MCFA treatments, either as a mixture or as individual fatty acids, and Sal CURB had the greatest effect of reducing detectable PEDV RNA, which follows the same trend as the main effect of treatment and the bioassay results. Feed treated with individual synthetic MCFA, MCFA mixture, or formaldehyde had fewer ($P < 0.05$) detectable viral particles than all other treatments. Day also had a significant impact on quantification of viral RNA, and CT increased from 29.5 to 34.6 CT from day 0 to 7, respectively. In summary, time, Sal CURB, 1% MCFA, 0.66% caproic, 0.66% caprylic, and 0.66% capric acids enhance the RNA degradation of PEDV in swine feed. Notably, the MCFA was equally as successful at mitigating PEDV as a commercially-available formaldehyde product in the complete swine diet at 1% inclusion and as individual fatty acids.

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