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Acidifier reduce African swine fever virus in commercial pig feed under tropical conditions

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Introduction:

The African Swine Fever virus (ASFv) causes lethal disease in pigs with mortality rates up to 100%. The virus has spread in Africa, Asia and Europe and has meanwhile reached the Caribbean. There is mounting evidence that feed or feed materials can serve as potential vectors for the introduction and transmission of AFSv. The application of various acids and their salts to diets for pigs has been studied extensively over decades. Numerous trials have demonstrated the mode and magnitude of action of organic acids as antimicrobials in feed for pigs and have established effective doses for piglets, fattening pigs and sows, among them the use of diformates. Recently, information has appeared that organic acids, e.g. formic acid and medium-chain fatty acids (MCFA) may exert a certain anti-viral impact, also against the ASFv. However, there are some limitations (high dosages, in-vitro data). Data on a combined approach of organic acids and MCFA are scarce. This study investigates the impact of an agglomerate of sodium diformate and MCFA on its ability to reduce the activity of the ASFv in feed under tropical conditions in northern Vietnam.

Materials and methods:

The experiment was designed to evaluate the viability of ASFv (p72, genotype II) over time (0, 1, 3 and 7 days post-inoculation) in commercial swine feed containing either 0% or 0.3% of an agglomerate of sodium diformate and MCFA (FORMI® Alpha, ADDCON, hereafter abbreviated to Alpha). The feed bags were incubated at room temperature (25°C) with a viral concentration of 10^8 HAD50/mL. After the appropriate post-inoculation incubation period, the surviving virus was eluted from the samples using RPMI 1640 medium with 5% fetal bovine serum. Each treatment used a set of triplicate samples that were combined and used for a single titration and inoculation into cells. Virus titers (HAD50/mL) were calculated by the Karber method. The quantity of ASFv was determined by real-time PCR to measure Ct-value. A significance level of 0.05 was used in all tests.

Results:

Mean abundance rates of ASFv in the positive control as well as FORMI Alpha-feed are shown in Table 1. The ASFv titration assay on cell cultures showed that the feed acidifier had a significant reduction activity against ASFv throughout the whole trial period, beginning only a few hours after the initiation of the trial. The 0.3% Alpha inclusion into the diet was able to inhibit the virus within less than one hour significantly (P=0.013), from 4.72 to 4.10 $Log_{10}HAD_{50}$. From day 1 onwards, the reduction was highly significant (P<0.001). On day 7, the ASFv was inhibited completely.

Table 1: Relative abundance (Log_{10} HAD_{50}) of ASFv in positive control (PC) and 0.3% FORMI Alpha-swine diets over time

Time	PC	FORMI Alpha	Difference (%)	*p*-value
Day 0	4.72^a	4.10^b	-76.0	0.013
Day 1	4.60^a	3.35^b	-94.4	0.0004
Day 3	4.07^a	2.27^b	-98.4	0.0006
Day 7	3.59^a	0^b	-100	0.0000

(a, b) Superscripts indicate statistically significant differences ($p \leq 0.05$)

Conclusion:

The addition of low dosages of FORMI Alpha caused a highly significant reduction of the viral load in swine feed – achieving complete inhibition of the virus after 7 days and can be consequently an economical and sustainable approach to curb the disease transmission while reducing infection probability for pigs exposed to virus-contaminated feed.