Feeding spray-dried porcine plasma to pigs contributed to delayed experimental African swine fever transmission and progression

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Introduction

African swine fever virus (ASFV) is a dsDNA virus that can cause high mortality in pigs of all ages. ASFV is primarily transmitted oro-nasally or indirectly by feeding garbage containing infected ingredients, biological vectors or fomites. Spray-dried plasma (SDP) is a highly digestible, high-protein level ingredient that is widely used in feed because it benefits growth performance, gut function, and immune parameters (1). The objective of this study was to evaluate the potential benefits of feeding SDP to naïve pigs in direct contact with pigs infected with ASFV *Georgia 2007/01* strain**.**

Material and Methods

A total of 24 pigs (24 d of age) were randomly assigned to either a control or porcine SDP (8%) feed treatment group. At housing, pigs were divided into two groups of 12 and fed their respective diets for the entire study. After 4 d of acclimation, 2 pigs in each box (trojans) were intramuscular (IM) injected with 10^3 GEC of ASFV strain Georgia 2007/01. The ratio of trojans to naïve pigs was 1:5 aiming to reproduce the slow transmission of the disease. Due to the unexpected lack of transmission to naïve pigs, by d 23, 3 additional pigs from each feed treatment group were selected as trojans, and IM injected on d 23 with the same indicated dose of Georgia 2007/01 strain. The ratio of trojans to naïve pigs after the second exposure was 3:7. Blood samples were collected at d4, 8, 15, 22, 29 and 35 of the study. Nasal (NS) and rectal (RS) swabs were collected on d4, 8, 11, 18, 25, 32 and 35 of the study. On d15 the T-cells response to ASFV exposure was analyzed. At the end of the study (d35), all pigs were euthanized and samples of submaxillary, retropharyngeal, and gastro-hepatic lymph nodes (LN), spleen, and tonsils collected. Taken samples were analyzed by RT-PCR.

Results and discussion:

During the first trojan exposure, no in-contact animals in either group became infected with ASFV and did not develop ASFV-specific antibodies (probably due to the short exposure time). However, all pigs fed with SDP showed low, albeit detectable, specific T-cells responses on d15. In clear contrast, only 2 of the 10 pigs fed the control diet showed detectable T-cell responses, indicating a lower immune priming. With these unexpected results, we decided to add additional trojans on d23. New trojans in the control group died 5 to 8 days post injection. However, 2 of 3 trojans in the SDP group survived until the end of the study (d12 post-challenge or d35 of the study). After the second trojan exposure (d23 of study), rectal temperature (RT) of contact pigs in the control group increased > 40.5ºC by day 30 of the study, however, in the SDP group of pigs this increase in RT was not observed until 4 days later (d 34 of study). Average cycle threshold (Ct) values for PCR results in blood, NS and RS at d35 (d 12 post-challenge) were 15.83±5.74, 25.47±4.72 and 33.14±5.13, respectively, for control contact pigs and 22.49±9.89, 28.19±4.07 and 31.99±5.94, respectively, for the SDP contact pigs. Average PCR Ct values were lower in the different tissues of control contact pigs compared with the SDP group (Table 1).

Table 1: Average ASFV PCR+ Ct values of different tissue samples from contact pigs at the end (d 35 or d12 after second exposure) of the study

	Treatment Groups	
ASFV PCR+ Tissue	Control	SDP
Submaxillary LN, Ct	19.15±2.35	24.10±7.48
Retropharyn. LN, Ct	20.70±2.91**	30.32±4.21
Gastrohepatic LN, Ct	22.14±5.47*	30.97±4.33
Spleen, Ct	16.86±2.69$^{\#}$	22.64±7.48
Tonsil, Ct	20.29±2.94*	26.48±5.71

Ct values of groups within a row differ; $^{\#}P<0.1$; $*P<0.05$; $**P< 0.01$.

Conclusions:

Under the conditions of this study, feeding spray-dried porcine plasma to pigs contributed to reducing ASFV transmission and progression, most likely by enhancing the ASF-specific T-cell responses, previously demonstrated as key rulers for ASFV protection (2). Feeding SDP can be a strategic nutritional intervention to improve protection against ASFV. In addition, feeding SDP during endemic ASFV situations with less virulent strains may help to reduce and delay transmission by direct contact.

References

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