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Positive effect of Aleta™ on PRRS virus infection of macrophages *in vitro*

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Key Conclusions
Aleta™ inhibited the infection and replication of PRRS virus in macrophages *in vitro*.

INTRODUCTION

Porcine reproductive and respiratory syndrome (PRRS) is a disease which is affecting pigs worldwide and has a huge economical impact, due to reproductive disorders and growth retardation. The virus is affecting all categories of pigs, from neonatal piglets to fattening pigs to pregnant sows. The financial impact in a fattening unit is substantial, but even worse in a breeding herd. At this moment there is no cure for the disease and vaccination is the most important tool to control the disease. Any additional tool for combatting this disease is welcome. β-glucans have been linked to antiviral immunity against PRRS virus (Xiao et al., 2004). Aleta is a product highly concentrated in beta-glucans, derived from algae. Consequently, the objective of this trial was to evaluate the effect of Aleta on PRRS viral growth and infection in porcine alveolar macrophages *in vitro*, as the virus is macrophage trophic.

KEYWORDS

Aleta™, PRRS, macrophages, antiviral

MATERIAL AND METHODS

An *in vitro* macrophage model was used to test the effect of Aleta against the PRRS virus. Porcine alveolar macrophages (PAM's) were cultured in a specific medium containing 2% fetal bovine serum (FBS) at a concentration of 1 mg/mL and cultured overnight at 37°C and 5% CO_2. Recipients (wells and tubes) were seeded with PAMs at a concentration of $2.5x10^5$. Cells were treated with different concentrations of algae beta-glucan (10 µm/mL to 0.01 µm/mL), diluted in specific medium containing FBS during 1 hour

at 37°C and 5% CO_2. Cells were infected (except the negative control) with PRRSV strain MN184 during 1 hour at 37°C and 5% CO_2.

Supernatant was collected at different time points (0, 12, 24, and 36 hours after infection) for determination of viral growth by qRT-PCR. The trial was replicated 3 times and results are the average of the 3 replicates.

The effect of algae beta-glucan on macrophage infection by PRRS virus was assesses by flow cytometry. Cells in tubes were fluorescently stained at 12 hours post infection with macrophage marker SWC3 and with monoclonal antibody SR30F for intracellular PRRS virus nucleocapsid (= genome + protein coat of a virus). Stained samples were run through the flow cytometer and nucleocapsids of the virus were measured using fluorescent-activated cell sorting (FACS) counting of 10,000 cells.

RESULTS AND DISCUSSION

Viral growth

Addition of algae beta-glucan into the culture system showed a reduction in the growth of PRRS virus. The highest concentrations of algae beta-glucan provided the most reduction at 24 hours. A dose-dependent reduction in viral growth was consistently achieved at every time point. The overall results show suppression of viral growth as low as 0.1 µm/mL dilution of algae beta-glucan.

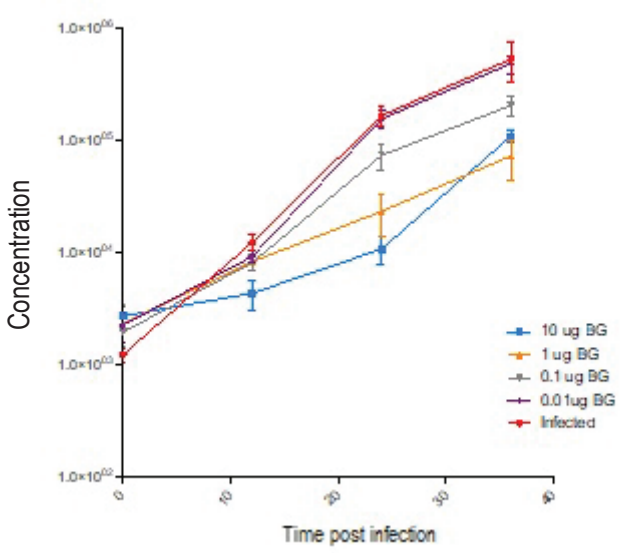

Figure 1. Viral growth of PRRSV at various dilutions of algae beta-glucan per mL, averaged over 3 replicates ± standard error.

Infection of macrophages

Algae beta-glucan showed a dose-depended inhibition of viral infection of macrophages. Infection was suppressed at the lowest dose of 0.01 µg beta-glucan per mL.

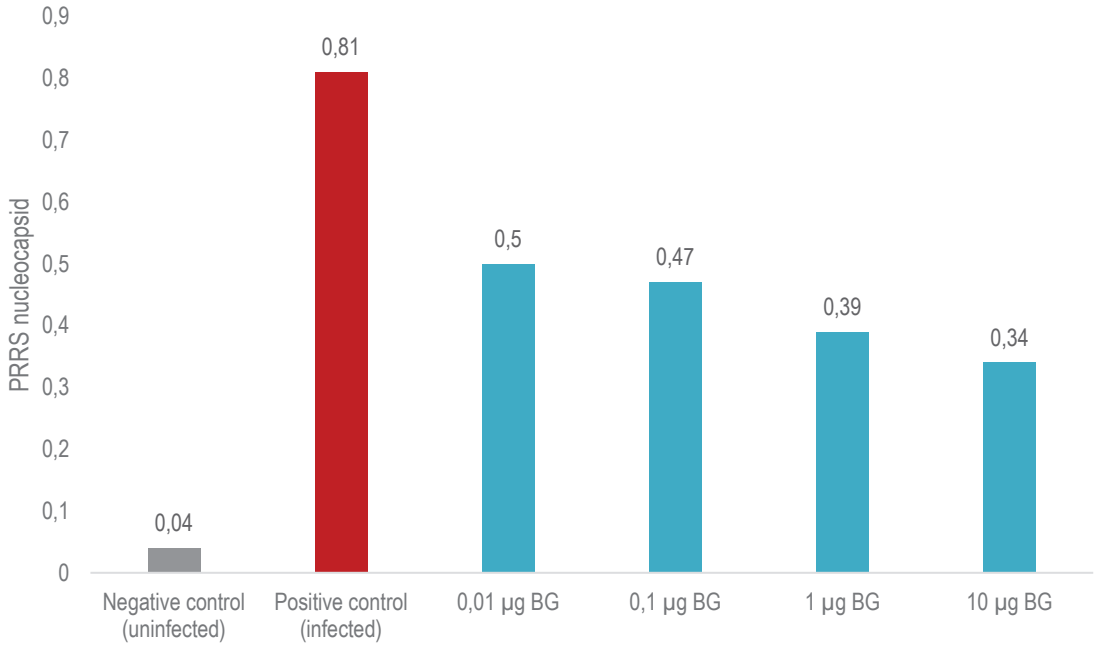

Fig. 2. Effect of algae beta-glucan on PRRSV infection of PAMs

CONCLUSION

In this trial, algae beta-glucan (Aleta™) showed a dose-depended inhibition of viral infection and replication of macrophages. In a previous trial regarding PRRS vaccination in pigs, Aleta™ showed an enhancing effect on vaccination efficacy: faster seroconversion and increased antibody titers. Consequently, Aleta™ could be a useful tool for a better PRRS protected pig herd through increased vaccination efficacy and hypothetically through a direct effect on viral replication.

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REFERENCES

1. WP-17-00061
2. TL-19-17536