Subtoxic levels of Deoxynivalenol (DON) deteriorates vaccination efficacy against PRRSv

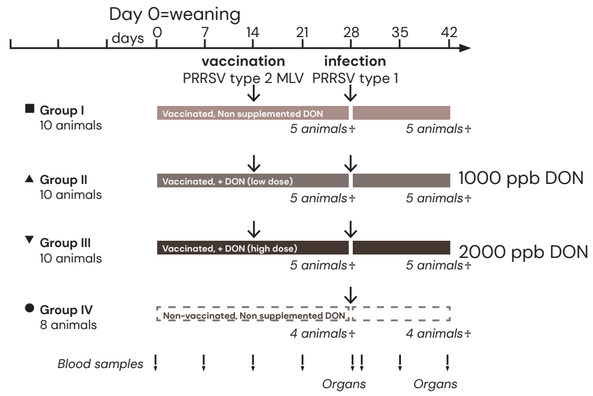
Rückner et al. Procine Health Management (2022) 8:13

Introduction

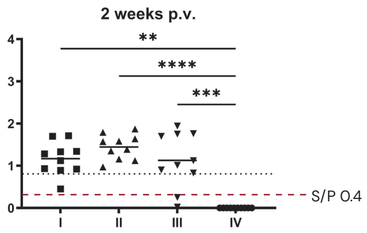
Porcine Reproductive and Respiratory Syndrome virus (PRRSV) is of huge detrimental economical importance in swine industry. Annual losses of 600 Million US-Dollars in US alone. Previous research indicates a negative effect of DON on vaccination response against PRRSv.
This is the first published study displaying immune-modulation in a vaccination-challenge trial (in vivo in piglets).

Trial Design

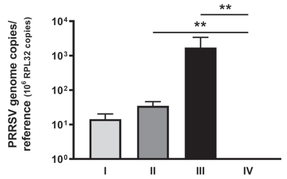
- Three-week-old piglets
- Vaccine MLV* PRRSV-2 (formerly "US-genotype")
- Challenged with PRRSV-1 (formerly „EU-genotype") at day 14 post vaccination (p. v.)
- Parameters assessed:
  - Clinical signs
  - Virus load in serum and organs
  - Serum antibodies (S/P ratio)



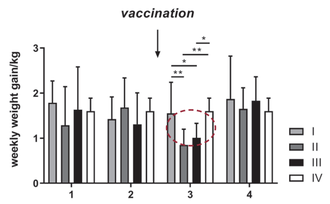
Results Vaccination



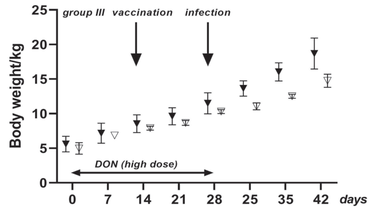
All vaccinated mounted an efficient PRRSv-specific antibody response within 2 weeks p.v. except two piglets in high DON group (III).



Both DON groups: higher viral load in lung samples 2 weeks p.v., possibly indicating delayed clearance of PRRSv by immune system or delayed virus replication.



In week 3 significant negative impact on weight gain in Low (II) and High (III) DON group, resp. 0.85 kg, 1.010 versus Control (I) 1.5 kg.



High DON (III) group: the 2 non-vaccine-responders (empty triangles) showed impaired weight gain versus the 8 responders. 20% of animals in this group ended with lower body weight.

Results Challenge

- Vaccinated animals (without DON exposure) stayed healthy (group I)
- **DON-groups** (group II and III) and non-vaccinated animals (group IV) **developed** mild **disease**
- Transient fever only in non-vaccinated (group IV)
- **Severity of disease** (by clinical scoring) **comparable** in **non-vaccinated animals** (group IV) and DON high group (group III)
- No significant differences in viral loads (lung, conjunctiva, liver) 14 days post infectionem

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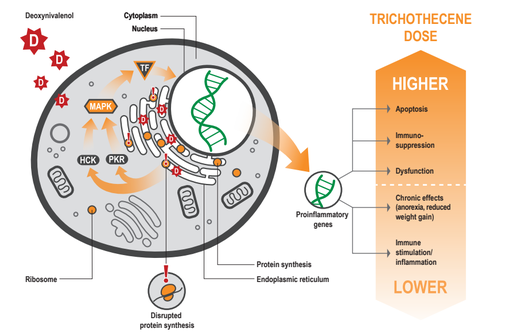
Conclusions & Implications for Swine Producers

- Exposure of weaned piglets to DON reduced vaccination efficacy of against PRRSv
- Findings are in accordance with literature (see also Savard et al., 2014)
- DON negatively impact body weight gain
- Consider mycotoxins as possible reason for unsatisfying vaccination outcomes

*Modified Live Vaccine

Mycotoxins Modulate Immune Responses

Mode of Action – Trichothecenes



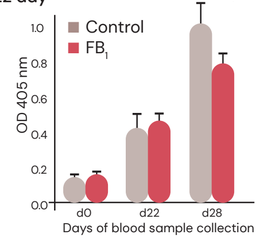
Mycotoxins & Vaccine Failure

- 32 piglets (12 kg)
- 8 mg FB_1/kg feed
- 28 days
- vaccination against *Mycoplasma agalactiae* on day 8 and 22 day

Chronic digestion of low levels of fumonisin leads to:

Reduced capacity of lymphocyte proliferation and specific antibodies

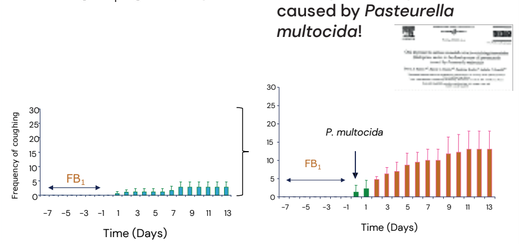
➡**vaccine failure**



Mycotoxins can increase development of pneumonia

- 20 piglets
- 9.6 kg +- 2.1
- 0.5 mg FB_1/kg BW/day

Oral exposition to fumonisins predisposes pigs to development of pneumonia caused by *Pasteurella multocida*!



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