Efficacy of RHINIFFA T® for the passive immunization of piglets using an atrophic rhinitis challenge model

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INTRODUCTION

Progressive Atrophic Rhinitis is a multifactorial disease caused by both *Bordetella bronchiseptica* and toxigenic *Pasteurella multocida*, (primarily type D). The dermonecrotic toxin of *P. multocida* plays a crucial role in the pathogenesis of the disease.
Vaccination of sows is among the most effective strategies used for the prevention of Progressive Atrophic Rhinitis in piglets. RHINIFFA T® contains inactivated bacterial cells of toxigenic *B. bronchiseptica* and toxigenic type D *P. multocida*, together with an amount of inactivated dermonecrotic toxin of *Pasteurella multocida* guarantying sufficient potency. The vaccine is adjuvanted in aluminium hydroxyde.
The efficacy of RHINIFFA T for the passive immunization of SPF piglets was tested using a *Bordetella bronchiseptica* and toxigenic *Pasteurella multocida* coinfection model under laboratory conditions.

MATERIALS AND METHODS

Five SPF sows were included in the study from which two were primo-immunized in 2 injections with RHINIFFA T 7-8 and 2 – 3 weeks before the expected farrowing date. The remaining sows were left unvaccinated. Piglets born from two unvaccinated sows (NV-C, n = 18) and piglets born from the vaccinated sows (V-C, n = 17) were intranasally challenged with 9.0 $\log_{10}$CFU of *B. bronchiseptica* (Bb) strain at 2 days of age and with 9.0 $\log_{10}$CFU of a toxigenic *P. multocida* (Pm) type D strain at 7 days of age . The remaining piglets were administrated culture medium (NV-NC, n = 11). A clinical monitoring was conducted until 6 weeks of age. Growth was recorded in piglets until 6 weeks of age. Necropsy was performed at 6 weeks of age for lesions evaluation and bacterial isolation.

Table 1: Experimental design

Group	Number	Vaccination schedule	Challenge
V-C	17	Born from vaccinated sows	Bb & toxigenic
NV-C	18	Born from	Pm type D
NV-NC	11	unvaccinated sows	None

Bb: Bordetella bronchiseptica; Pm: Pasteurella multocida

Average and median turbinate lesion scores were compared using nested ANOVA and Mann Whitney test. Other statistical inferences were performed using Fisher`s Exact test.

RESULTS

No general or local reaction was observed at vaccine injection in sows.
Following challenge, sneezing was observed in NV-C piglets few days following *B. bronchiseptica* challenge which increased following *P. multocida* challenge concomitantly to the appearance of cough. Clinical signs in this group remained high. V-C piglets definitely show lower clinical signs which tended to disappear. Growth from birth to 6 weeks of age for NV-NC and V-C piglets was comparable (340 g/day) and definitely higher than NV-C piglets (281 g / day). At necropsy, pneumonia and severe to total destruction of nasal turbinates was observed in 44 % and 88 % of NV-C piglets respectively and in 6 % and 0 % of V-C piglets. In lungs, only *B. bronchiseptica* was reisolated from lungs of NV-C piglets (44 %). In nasal cavities, *P. multocida* and *B. bronchiseptica* were reisolated in NV-C piglets in respectively 94 % and 77 % cases as well as in 23 % and 47 % in V-C piglets.

Figure 1: Clinical sign results in challenged groups: 1a. Sneezing frequency; 1b. Coughing frequency; 1c. Coughing fit frequency

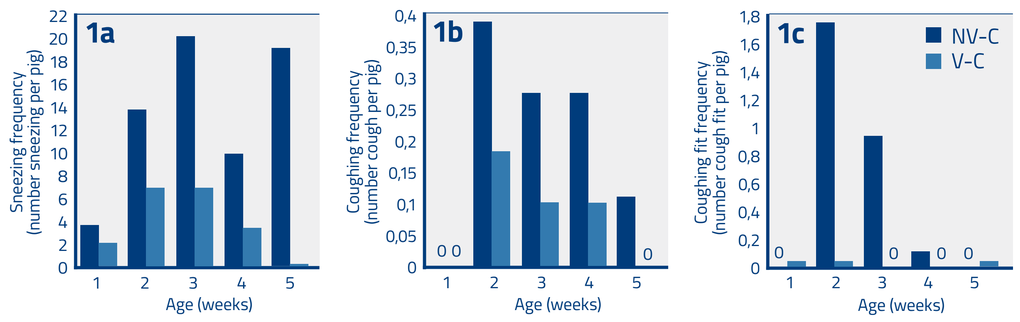


Figure 2: Necropsy results in challenged groups: 2a. Distribution of turbinate lesion scores (grid max = 16); 2b. Prevalence of pneumonia

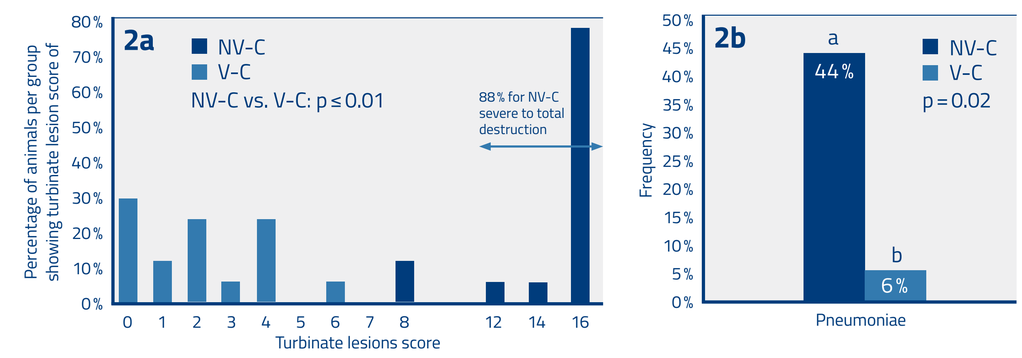


Figure 3: Frequency of Bb and Pm isolation from nasal cavities and lung lesions in challenged groups

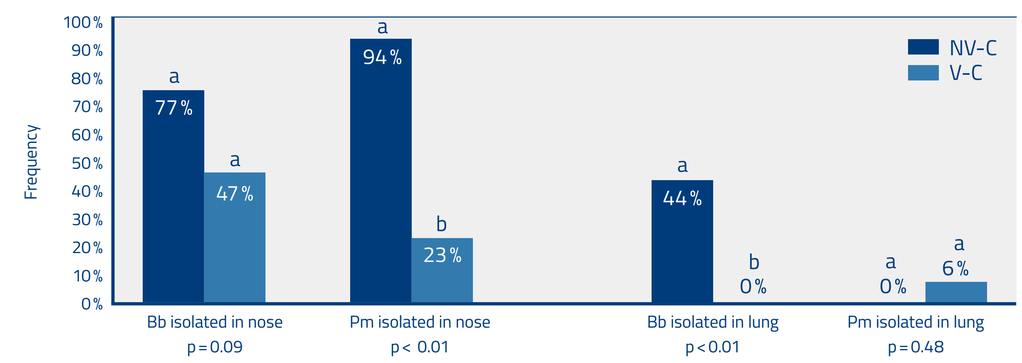
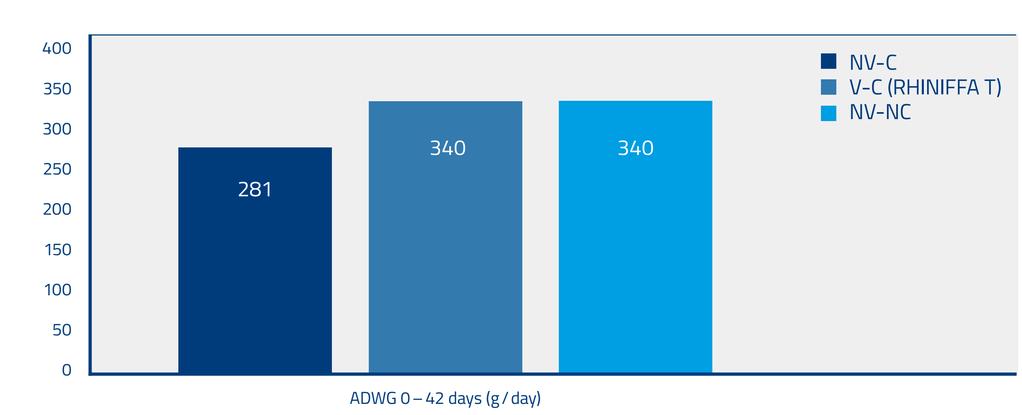


Figure 4: Growth performance between birth and 6 weeks of age in the experimental groups



DISCUSSION AND CONCLUSION

This study showed the efficacy of RHNIFFA T for the prevention of Progressive Atrophic Rhinitis caused by *Bordetella bronchiseptica* and toxigenic *Pasteurella multocida* coinfection.