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 guaranteeing 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 log10CFU of a toxigenic B. bronchiseptica (Bb) strain at 2 days of age and with 9.0 log10CFU 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

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Vaccination schedule</th>
<th>Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-C</td>
<td>17</td>
<td>Born from vaccinated sows</td>
<td>Bb &amp; toxigenic</td>
</tr>
<tr>
<td>NV-C</td>
<td>18</td>
<td>Born from unvaccinated sows</td>
<td>Pm type D</td>
</tr>
<tr>
<td>NV-NC</td>
<td>11</td>
<td>unvaccinated sows</td>
<td>None</td>
</tr>
</tbody>
</table>

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.

DISCUSSION AND CONCLUSION
This study showed the efficacy of RHINIFFA T for the prevention of Progressive Atrophic Rhinitis caused by Bordetella bronchiseptica and toxigenic Pasteurella multocida coinfection.