Evaluation of the tolerability of the Salmonella Typhimurium live vaccine Salmoporc® for oral administration in three day old piglets


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Abstract

Vaccination against Salmonella is a measure to reduce salmonella disease in pigs. In this study a S. Typhimurium live vaccine (Salmoporc®, Impfstoffwerk Dessau-Tornau, Rossau, Germany) was applied to 3 day old conventional piglets in order to investigate safety and persistence of the vaccine strain in different tissues. The results indicate that an early vaccination against Salmonella shall be deemed to be safe.

Introduction

Salmonellosis is one of the most important food-associated zoonosis and pork is an important source of S. Typhimurium infections for humans (HAEBROUCK et al., 2004). Since Salmonella is widely distributed in the environment, control is difficult to achieve (LETELLIER et al., 2000). Vaccination against Salmonella in pigs appears to merely reduce the infection pressure and is effective especially in addition to other measures taken at farm level (HAEBROUCK et al., 2004). The aim of this study was to examine a S. Typhimurium live vaccine for its safety in 3 day old piglets applicated by the oral route.

Material and methods

Salmonella negative piglets (n=32) were vaccinated orally twice with a S. Typhimurium live vaccine Salmoporc® (Impfstoffwerk Dessau-Tornau, Rossau, Germany) when the piglets were 3 and 21 days of age. The faeces consistence, body temperature, sucking frequency, and general health status were evaluated in a period of time comprising 8 hours after vaccination. Control of body weight was done weekly. The immunological response to this early vaccination was measured and the spread and persistence of the vaccine strain in different tissues was investigated by a bacteriological examination. Physiological NaCl solution was administered to the control group (n=28) orally.

Results

The piglets vaccinated twice with the single dose showed a significant higher mean body weight at weaning with an age of 4 weeks (7.63 kg) compared to the unvaccinated pigs (6.47 kg) (p<0.05). The vaccine strain was detected in faeces until day 7 after the second vaccination. The colonization of the internal tissues with the vaccine strain was timely restricted until six weeks after the second immunization, as a sample of the ileum and the colon have been found to be positive (Tab. 1). The vaccine strain was isolated in decreasing amounts from samples of the ileocecal lymph nodes, the ileum, caecum content, colon, lung, liver and skeletal- and heart muscle. Samples from the kidney were not found to be positive at any time. Salmonella field strains could be detected neither in the control nor in the vaccinated group in any time during this study. A serological response in answer to the vaccination on day 3 and 21 could be seen from day 7 after the second vaccination (Fig. 1). The maximum of the mean antibody titre concentration was measured on day 49 after the second vaccination.
Figure 1: Mean antibody titre in the vaccinated and unvaccinated group

Table 1: Number of Salmonella vaccine positive tissues samples post vaccination in the vaccinated group from 2 piglets per day

<table>
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<tr>
<th>Tissue</th>
<th>Small intestine</th>
<th>Colon</th>
<th>Caecum</th>
<th>Lnr.</th>
<th>Lung</th>
<th>Liver</th>
<th>Skelet. muscle</th>
<th>Heart</th>
<th>Kidney</th>
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</table>

Total 12 4 3 2 1 1 1 0 2 0 28

3.p.II – 56.p.II: 3. and 56. day after 2. vaccination

Discussion

In Western Europe, S. Typhimurium accounts for most of the cases of clinical salmonellosis (HAEBERT et al., 2004). It is not possible to prevent an infection with Salmonella or to eradicate Salmonella on the farm level by antibiotics. Furthermore the therapy for long times is not effective in preventing the shedding and infection with Salmonella (ROESLER et al., 2005). For these reasons the prophylaxis by vaccination is very important strategy in farms with Salmonella problems. After experimentally infections Salmonella can be isolated in samples from the liver, spleen, lung, kidney and skeletal muscles (COTÉ et al., 2004). The highest isolation rate results in the investigation of tonsil samples, followed by samples of the jejunum and caecum (WOOD et al., 1989). In the presented study the colonisation of the tissues are similar as described by other authors. This is important to assume a sufficient immune reaction of the organism (HAEBERT et al., 2004; SELBITZ, 2001). The duration of the persistence is in this study sufficient to stimulate the cellular immunity. A contamination of carcasses or organs in the abattoir can be excluded, because the colonization of the internal tissues with the vaccine strain was timely restricted until six weeks after the second immunization, as a sample of the ileum and the colon have been found to be positive. When piglets are vaccinated with the considered doses at the 3 and 21 day of live an introduction of the vaccine strain in fattening units is unlikely. Therefore a serological reaction of unvaccinated fattening pigs is not possible. It was not possible to detect a serological response after the first vaccination at day 3. An interaction with maternal antibodies can not be excluded.
Therefore a serological response was detected after the second vaccination on day 21. Perhaps it is possible to vaccinate sows and to vaccinate their piglets on day 21.

Conclusions

Vaccination of 3 day old piglets with a S. Typhimurium live vaccine seems to be safe. For reasons of practicability the application of the vaccine is more considered in 3 and 21 day old piglets, compared to licensed application in 3 and 6 week old piglets.

References


