Within the framework of the German-Dutch INTERREG V A-project Food Protects, oral fluids (OF) were tested under field conditions for their suitability in antibody detection against Salmonella spp. as a means of herd classification.

In all, 120 OF, 600 blood sera (BS), and 60 pooled faeces samples were collected from 20 pig farms with different histories of Salmonella prevalence in Germany at the beginning, in the middle, and at the end of a fattening period. Serum samples were analyzed by Swine Salmonella ELISA A (cut-off 40 OD%) and compared to the OF samples using Swine Salmonella ELISA B with some modifications. Faecal samples used as reference were analyzed by culture and PCR for Salmonella spp. The cut-off value for Salmonella OF ELISA (B) was determined by ROC analysis.

For the OF Swine Salmonella-ELISA Kit B, the cut-off values of 29 OD% (positive) and 10 OD% (negative) were determined at the specificity and sensitivity level of greater than 95%. Results achieved by the OF Swine Salmonella ELISA represent the approximate mean of the results of all individual BS samples of the same animal group. The 120 statistical mean values from BS results were compared to OF results of the same animal group; 98 of these means tested negative for ELISA A, while 72 OF samples of the corresponding animal group were negative and 20 doubtful for ELISA B. S. typhimurium was identified by culture and PCR from six of the faecal samples, these were also positive by BS and OF. Five of the faecal samples were negative by culture, but positive by BS and OF.

The present study demonstrates that OF samples are promising for use in Salmonella herd monitoring but also that further studies are needed for to evaluate Salmonella OF ELISA for monitoring the Salmonella load of swine herds.
Adaptation and validation of a Salmonella ELISA for the detection of antibodies in oral fluid samples from pigs

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Introduction and Objectives:

In Germany, all pig-fattening farms must take part in a mandatory serological Salmonella monitoring system by analyzing meat juice or serum samples shortly before slaughtering. Depending on the results, farms are classified in 3 categories according to the percent of positive samples: cat. 1: 0%-20%; cat. 2: 20%-40%; and cat. 3 >40%; these categories have different consequences for the reduction of Salmonella infection in the pig herds.

Within the framework of the German-Dutch INTERREG V A-project food Pro.tec.ts, oral fluids (OF) were tested under field conditions for their suitability for the detection of antibodies against Salmonella spp. as a means of herd classification. Can this tool be used to classify the herds?

Materials and Methods:

Samples were collected from 20 pig farms in Germany with different histories of Salmonella prevalence at the beginning, in the middle, and at the end of a fattening period: in all, there were 120 OF, 600 blood sera (BS), and 60 pooled faecal samples. The sampling locations were in North Rhine-Westphalia near the border to the Netherlands. OF samples were taken using an oral fluid collection kit (Fig. 1; IVD GmbH, Germany). During the project month, fixation procedure was improved by the addition of metal hooks (Fig. 3).

Serum samples were analysed by BS Swine Salmonella ELISA A (individual cut-off: 10 OD%; monitoring cut-off: 40 OD%) and compared to the OF samples using Swine Salmonella ELISA B with some modifications. Faecal samples used as reference for the Salmonella status of the animal group or herd were analyzed by culture and PCR for Salmonella spp. The cut-off value for the modified Salmonella OF ELISA was determined by ROC analysis.

Results:

In all, 103 of 120 (86%) serological results were consistent with those from OF and with the mean of the BS. Only 2 OF samples were classified positive, whereas the same animal groups were classified negative by BS sampling; on the other hand, 15 samples of animal groups were classified positive by BS but not by OF.

BS-ELISA results showed a broader range, especially near the positive monitoring cut-off (>40 OD%), perhaps because antibodies in BS are longer detectable after Salmonella exposure. (This part of the project is still in progress.) This situation has been previously shown for other agents (Strutzberg-Minder et al. 2015 JSHAP). As a consequence, 13 more animal groups were classified positive by BS (22 groups positive) than by corresponding OF samples (9 groups positive).

Conclusions:

Collection of OF samples is both easy for the animal farmer and animal friendly! OF sampling has been approved for monitoring systems and controlling the dynamics of infection processes. The present study also demonstrates that OF samples are promising for use in Salmonella herd monitoring, as well, and that it is possible to classify herds for Salmonella load by OF samples. Further studies are in progress to evaluate Salmonella OF ELISA for use in the Salmonella monitoring system.

Results:

The cut-off values for the OF Swine Salmonella-ELISA have been determined to be below 10 OD% for negative and over 29 OD% for positive at the specificity and sensitivity level above 95%. Results achieved by the OF Swine Salmonella ELISA represent the approximate mean of the results of all individual BS samples of the same animal group. The following diagrams show all results of 3 different herd profiles as examples of possible scenarios.

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