Implantable microchip transponders for body temperature measurements in pigs

Objective
Body temperature is a simple, but clinically important parameter in monitoring the health status of pigs, both at individual level and herd level. The standard procedure for obtaining such data is normally performed by recording of the core body temperature, using a rectal digital thermometer. This work, however, can be quite time consuming and laborious, and further compromising the immediate well-fare of the pig, when restraining of the individual animal is necessary. Therefore, an electronic body monitoring system using implantable microchip transponders for measuring peripheral body temperature was tested, in order to evaluate the utility and reliability of this tool, in domestic pigs. The system is presently used and well optimized in small laboratory animals [1, 2].

We tested the microchip transponders during experimental infection of pigs with classical swine fever virus (CSFV), a viral infection, which can cause high fever in infected animals. Materials and Methods
Implantable, programmable temperature transponders (IPTT-300TM) from Bio Medic Data System (Plexx, the Netherlands), designed for non-surgical implantation into animals, was tested in 30 weaner pigs. One microchip transponder was injected deep subcutaneously by the left ear base of each individual. The transponder was before insertion programmed with ID identical to the individual pig's ear tag number. The pigs were randomly divided into 3 groups: one group placebo-infected and two groups virus-infected with 2 different strains of CSFV, one of them known to induce pyrexia. Peripheral body temperature recorded from the transponder by a hand-held scanner and core body temperature recorded by a conventional rectal digital thermometer was registered on a daily basis for 3 weeks. The data set obtained for the 2 methods were compared. As the pigs included in this experiment were sequentially killed and hence the number of pigs within each group was reduced with 3-4 individuals per week, the corresponding data sets diminished during the experimental period. Results
All virus inoculated pigs were infected with CSFV, as determined by virus detection. So, the transponder system was tested in both clinically healthy and clinically ill pigs with physiologically normal body temperature or fever, respectively. The data obtained in this study, showed a correlation between the two methods for monitoring body temperature. The peripheral body temperature measured by the microchip transponder was on average 0.5-1.0 °C lower than the core body temperature measured by rectal thermometer, in all 3 groups. However, the paired data sets followed the same pattern throughout the experimental period. Standard deviation of the mean values of body temperature on the individual days in the respective groups was larger for the transponder data compared to the rectal data, indicating less accuracy for the monitoring system when used on individual animal level.

Discussion and Conclusion
Comparison of the data sets from the 2 methods showed that the peripheral subcutaneous body temperature recorded by a microchip transponder may be interesting as a monitoring tool in the clinical surveillance of the health status of domestic pigs. This technology has not at present the power to monitor individually sick pigs, where accurate core body temperature is important for supervision and treatment of the specific animal. However, on group or herd basis this system could be valuable in overall herd surveillance where data on body temperature could be included as an early indicator of changes in infectious disease status.