

# Catheterization of the genital tract in female minipigs

## - when using the minipig as a model of human genital infections

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The reproductive system of the minipig resembles the human reproductive system more closely than that of any other animal species. In addition, large parts of the porcine immune system are well described and very similar to the human system. These factors, together with practical advantages, such as easy handling and sufficient sample material, make the minipig an optimal model for studying human genital infections.

### Chlamydia vaccine research

In our research group, we use sexually mature Göttingen Minipigs from Ellegaard as models of human genital *Chlamydia trachomatis* infection in the development of a chlamydia vaccine for human use. In our previous vaccine trial studies, we found that minipigs raise a clear antibody and cell-mediated immune response against the vaccine candidates. However, our challenge has been to establish a persistent chlamydia infection in the genital tract. It is important to establish an infection in order to evaluate the protective capacity of a vaccine candidate. One of the challenges in the establishment of an infection in the minipig's genital tract is to guide the bacteria through the cervix. The purpose of this article is to share our knowledge on how an inoculation of the (upper) genital tract can be done non-invasively in the minipig.

### Catheters for the minipig genital tract

We tried different catheters for the inoculation of the genital tract in the minipigs – e.g. insemination catheters for conventional pigs, an insemination catheter for dogs and catheters for embryo transfer in pigs – but without success. The porcine cervix is long and complex with winding pulvini, which makes it difficult to insert a catheter through the cervical region. We finally found a successful non-invasive method that could convey bacteria through the cervical region (*Figure 3*) by combining two catheters: the Osiris dog catheter (E-vet, Denmark) and a urinary catheter (Buster, 2 x 500 mm, Kruuse, Denmark) (*Figure 1*).

Initially, the inner catheter pipette is removed from the Osiris catheter. The labia are cleaned thoroughly with water and ethanol disinfectant before inserting the insemination catheter. The outer Osiris catheter tube is guided through the vagina (following the dorsal surface) to fit into the caudal end of cervix and to be used as a kind of trocar (*Figure 2*). Once the tube is fixated in the cervix, the balloon is inflated very carefully and with

only a small amount of air (1 mL, depending on the flexibility of the genital wall), and the Buster urinary catheter is guided through the Osiris catheter as far as possible through the cervix. Slight pressure and, if necessary, winding counter-clockwise, are needed to pass the pulvini in the cervical region, however, one has to be very careful to avoid perforating the genital tract wall, which can easily happen, especially in anoestrus. Once the catheter has been placed properly (*Figure 2*), approximately 15 mL can be injected without direct reflux. We recommend a 10 mL bacterial suspension (or other test substance) and 2 mL of pure, sterile SPG (or something similar) to flush the catheter. After inoculation, we let the pigs lie for 20 minutes with elevated hindquarters to avoid reflux.

We inoculate the minipigs in oestrus when the cervix is softer, which makes it easier to properly position the insemination catheter. Furthermore, studies have shown that the endometrium is more susceptible to *Chlamydia* during oestrus. When working with risk-group 2 microorganisms such as *C. trachomatis*, we prefer to do the inoculation during anaesthesia. However, when working with other microorganisms or substances, it is also possible to inoculate the genital tract during standing oestrus, in cooperation with a teaser boar.

In conclusion, this short article describes how inoculation of the genital tract can be done non-invasively in the minipig. It will hopefully add useful knowledge to the use of the minipig as a model of genital tract infections and save others some initial work.

We would like to thank Ellegaard Göttingen Minipigs, and especially Helle Lorentsen, for their great help and professional and kind service at all times.

Figure 1: The combination of the two catheters has proven to be suitable for catheterisation of the cervix in minipigs.

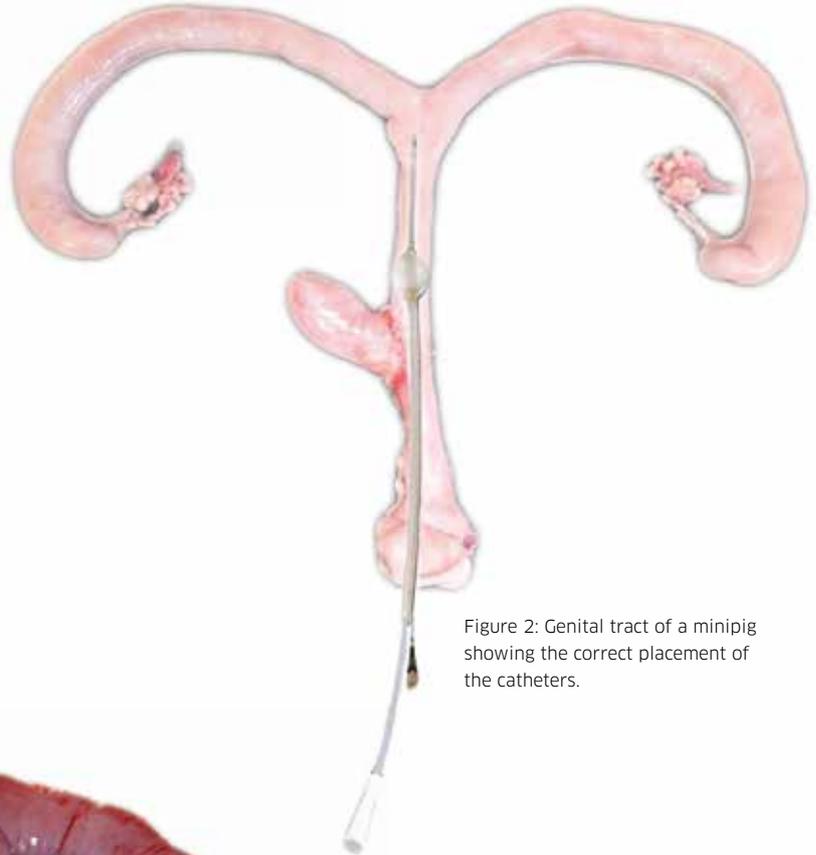
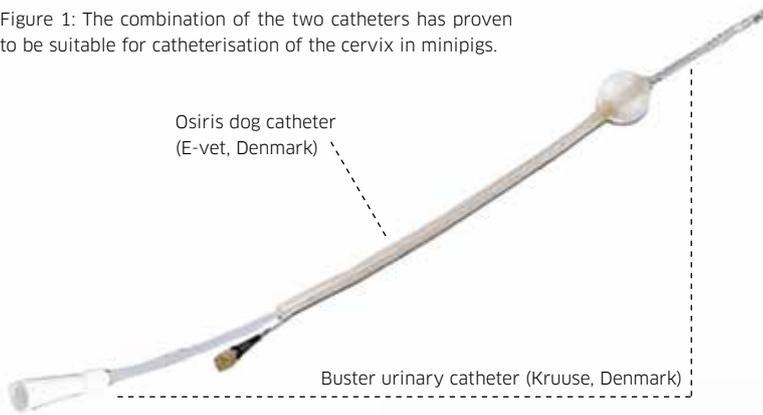


Figure 2: Genital tract of a minipig showing the correct placement of the catheters.

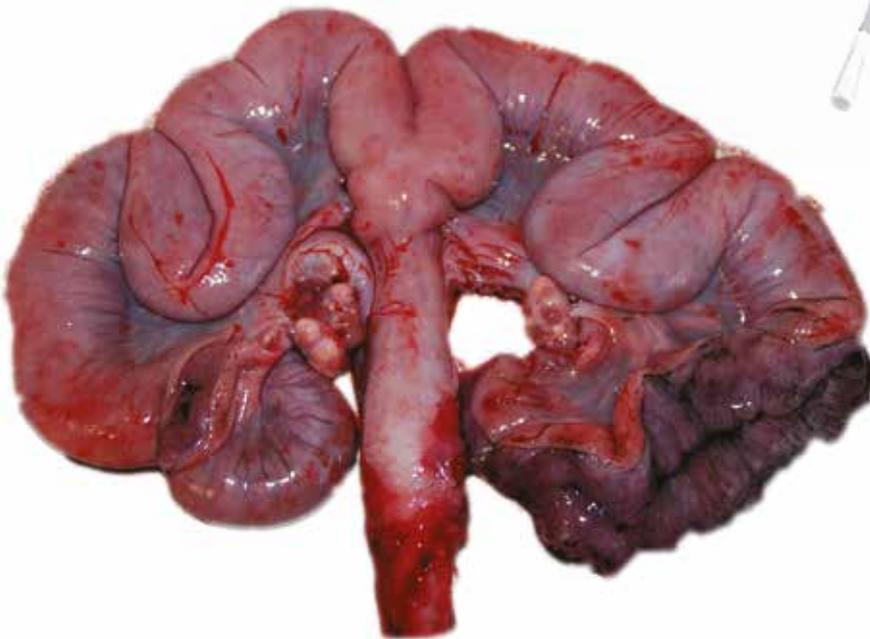


Figure 3: Following the injection of black ink using the described method of cervical catheterisation, this figure shows successful distribution to the outermost part of the uterine horns.