

Press information

Sex determination by genome editing in pigs successful

Study identifies alternative to piglet and immunocastration

Mariensee, 07 January 2021. Scientists of the Institute of Farm Animal Genetics of the Friedrich-Loeffler-Institut (FLI) succeeded in modifying pigs genetically, so that they developed female sex characteristics despite having a male chromosome set. This could be a future alternative to piglet castration to prevent the “boar taint” of the meat of non-castrated male fattening pigs, which some consumers find offensive.

The study, published in the renowned scientific journal “Proceedings of the National Academy of Sciences of the United States of America” (PNAS), describes the generation of genetically modified pigs, in which a specific region of the Y chromosome was knocked out. The region in question is the “high mobility group (HMG) domain”, a central unit within the SRY gene that plays a key role in early embryonic sex determination. Under the scientific supervision of Dr. Björn Petersen, Stefanie Kurtz used the CRISPR/Cas system to knock out this HMG domain as part of her PhD work. This resulted in pigs carrying a male chromosome set but exhibiting female sex characteristics.

The study showed that the reproductive organs of genetically modified nine-month-old pigs remained significantly smaller compared to female controls of the same age and that the animals were infertile, suggesting the involvement of additional genes in the differentiation of the reproductive organs. *“The results could provide the basis for a possible alternative to surgical castration in commercial pig production to prevent boar taint. In addition, due to the genetic, physiological and anatomical similarities between pigs and humans, the animals represent a novel large animal model for sex determination studies, which also provides new research approaches for associated developmental disorders in humans,”* says Dr. Björn Petersen.

In mice, it has already been shown that SRY plays an important role in male sex determination. However, it has not been known so far which areas of the SRY region are responsible for sex determination and whether this also applies to other mammals.

Study

Stefanie Kurtz et al. Knockout of the porcine SRY gene causes sex reversal in gene-edited pigs.

Proceedings of the National Academy of Sciences of the United States of America (PNAS)

DOI: <https://doi.org/10.1073/pnas.2008743118>

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