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Generation of transgenic chimeric ducks using blastoderm cell transfer CRISPR/Cas9-mediated gene insertion into the duck genome

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Statement of the Problem: The ability to culture and genetically modify embryonic cells changed developmental biology. The production of transgenic birds has increasing applications in biotechnology. There are various methods of birds transgenesis and the production of germline chimeras. The technique of injection DNA under the germinal disk could be used as one of the effective and often used methods. Weak reproductive ability and low survival rate of the produced chimeras are the main disadvantages of this method.

Methodology & Theoretical Orientation: In order to produce germline chimeras, the embryos of the Shan partridge duck were used as recipients, and blastodermal embryos of Shaoxing ducks were used as donors. Recipients were sterilized using ultraviolet light irradiation. The isolated blastodermal donor cells were transfected with the DNA-construction (CRISPR/Cas9-mediated gene insertion into the duck genome) with lipofectamine which was inoculated under embryo of the of the recipient eggs.

Findings: Survival rate of recipient embryos following transfected was 6.98% (19/272). After hatching, eleven female and eight male alive birds (3 % of the manipulated embryos) were obtained. Five of eleven female founders and five of eight male founders carried the transgene construct, and the transgenic bird production efficiency was 44.4% (from survive). Among the five male founders, only one (number 28) was most fertile. It produced 34 descendants (18 females and 14 males), of which two sons and nine daughters were transgenic (32.2%). Thus, the obtained data indicates that this technique the positive outlook on usage CRISPR/Cas9-mediated gene insertion into the duck genome of the Shan partridge and Shaoxing duck model for creating transgenic ducks and should be useful in developmental studies and may facilitate the production of transgenic poultry as the exogenous DNA was successfully inserted into the duck genome.

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Biography

Mariia Doroshenko is a doctor of veterinary medicine and a PhD student at the Department of Genetics, Breeding and Biotechnology of Animals at the National University of Life and Environmental Sciences of Ukraine. Her work is based on gene polymorphism in breeding. She has engaged in genetics and breeding in poultry work for more than two years.

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