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"Bridging the gap between increasing knowledge and decreasing resources"

African Trypanosomiasis Resistance in Cattle by a Transgenic Approach

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Abstract

African trypanosomiasis, caused by extracellular protozoan parasites (*Trypanosoma*), is a major disease in cattle that affects agricultural production in broad regions of Africa. The parasites are transmitted between mammals by infected tsetse flies (*Glossina* sp.) during blood feeding. Both wild and domestic animals are potential reservoirs of the parasites for human infection resulting in human sleeping sickness. In order to control the disease, we proposed a new strategy for creating resistance in cattle to African trypanosomiasis by a transgenic approach. Using the technique of somatic cell nuclear transfer (cloning), we aim to establish genetically modified cattle on the background of a Kenyan indigenous breed – Kenyan Boran, which carry a gene that imparts resistance to African trypanosomes. The gene, apoL-1, encodes the key trypanolytic component of baboon's protective Trypanosome Lytic Factor (TLF) against both cattle and human infective trypanosomes. TLFs are only found in humans, gorillas, sooty mangabys, mandrills and baboons and govern resistance to different African trypanosome species. Baboons are remarkably resistant to all African trypanosomes due to its TLF, specifically apoL-1. Previous research with transgenic mice has shown that the baboon apoL-1 product was able to confer protection to the mice against trypanosome infection. Therefore, we hypothesise that expression of baboon apoL-1 in cattle will also endow endogenous resistance to trypanosomes. As the proof of concept step, we have successfully set up and tested the platform for somatic cell nuclear transfer using Boran bovine embryonic fibroblasts (BEFs). In total, two cloned calves were born by caesarean section operation. One calf survives up to today and is in good health. Attempts are ongoing to introduce the apoL-1 gene into two of the BEFs lines for future production of transgenic cattle.

Keywords: African trypanosomiasis, apoL-1, Kenyan Boran, somatic cell nuclear transfer

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