

Mzima livestock project

Transgenic, trypanosome-resistant livestock



Background

Trypanosomiasis is one of the most significant constraints to cattle production in Africa, directly affecting livestock productivity (meat and milk production) and indirectly lowering general farm productivity as cattle can play a crucial role as beasts of burden.

A study mapping the benefits of eradicating trypanosomiasis in the Horn of Africa estimated that benefits per square km would be up to USD12,500 over 20 years in areas where the disease's impact and costs are highest.

Existing trypanosomiasis control measures include insecticide use to control tsetse populations, which is expensive and has as yet unquantified environmental effects. Efforts to develop a vaccine against the parasites have not yielded positive outcomes due to the ability of the pathogen to vary its surface coat. Although some breeds native to West Africa are tolerant to infection with trypanosomes, they are small and unproductive and continue to harbour and transmit pathogens. An alternative approach is required.

Mzima project objectives

Established in 2013 with funding from various sources, the Mzima project seeks to introduce resistance into cattle and goats by means of genome editing.

Success to date

To date, the project has demonstrated the effectiveness of a genome editing approach in introducing resistance to

trypanosomes in mice. Next, it is hoped that the International Livestock Research Institute (ILRI) and partners will produce the first genome edited cattle for evaluation and testing. As proof of principle, ILRI has produced the first cloned, but not genetically modified, Boran bull in Africa, and named him Tumaini (a Swahili word meaning hope). Tumaini has gone on to produce healthy offspring.

The adoption challenge

The project team is aware of the complexities of introducing new technologies into general use. This is also a novel area for regulators. In order to address these challenges there has been a broadening in focus as the team grows to include wider program management, social science and adoption of innovation expertise.

Defining a testing route map

As part of the process, the project has worked to establish open relationships with regulators and other stakeholders. This engagement is important in building trust and in appreciating each other's needs so as to facilitate the eventual adoption of genome-edited, trypanosome-resistant, Mzima cattle. Steps taken include:

- In January 2017, a broad range of stakeholders, including economists, veterinary scientists, smallholders and biosafety regulators met to develop a theory of change, examining the issues of the burden of trypanosomiasis, stakeholder and power mapping, impact analysis of Mzima cattle and the challenges and the priorities for action.

- In February 2018, Kenyan and international experts met to consider issues related to containment and alignment with the emerging national biosafety guidelines and animal welfare, among others.
- The establishment of a comprehensive and transparent testing schema, or route map, to build the knowledge to provide confidence in the viability and safety of these cattle.
- speed up the route to testing by adopting an animal with a shorter generation cycle than cattle.

Mzima goat project objectives

In 2018, the work of the project was expanded to include goats. Goats are significant contributors to the livelihoods and nutritional outcomes in smallholder households. This part of the project seeks to:

- expand the program to other economically important livestock;

Photo credits

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July 2018