

Tsetse Repellent Technology

science-led innovation changing the livelihoods of poor livestock keepers in Africa

Abstract:

The innovative tsetse repellent technology is fruit of years of research with the strategic objective of promoting research and technological innovations to combat food security by supporting the delivery of international public goods contributing to food security. Recent research at *icipe* has led to the development of a tsetse repellent technology that expands the arsenal of techniques for trypanosomiasis control. Importantly, the technology also reduces the use of trypanocides. This technology involves controlled-release of potent repellents from prototype dispensers (specifically designed to facilitate release of the repellent at a constant rate) that individual cattle wear encircling their necks. Our results indicate that these repellents provide substantial protection to cattle. Farmers' perceptions of the technology are very positive.



A cow fitted with repellent collar. This mobile technology developed by *icipe* keeps the cattle and herdsmen safe from tsetse and other biting flies

Most livestock keepers prefer the repellent technology compared to other tsetse and trypanosomiasis control options due to the technology's simplicity and mobility and demand for the dispensers is very high. This technology once fully optimised will thus not only directly benefit the livelihoods of the marginalised pastoralists and agro-pastoralists but even the livestock herders in open rangelands.



Context

The *icipe* tsetse repellent project was designed as a response to our observation that the NGU tsetse traps developed by *icipe*, despite their effectiveness were not entirely ideal for pastoralists like the Maasai of Eastern Africa. For them, a 'mobile' technology would better suit their way of life. This led *icipe* to the discovery of two different types of repellents and the innovative repellent collars, which are tailored for pastoralist communities, but are also increasingly popular with sedentary livestock keepers.



Maasai herdsman take their cattle to any place where there is grass. Repellent collars offer a 'mobile' technology that is ideal for this lifestyle

Repellents for the control/management of tsetse have been identified at *icipe* from synthetic sources and from natural blends of un-preferred animals (e.g. waterbuck), which are common in tsetse habitats but not fed upon. The synthetic tsetse repellent 2-methoxy-4-methylphenol (*icipe* patent) and the 5-constituent waterbuck repellent blend (*icipe* patent) are being validated in large-scale field trials.

Goal: The project aims to contribute towards the improvement of food security for the poorest and most vulnerable through pro-poor technological innovations.

Objective of the project: The specific objective seeks to improve the welfare and general prosperity of livestock keepers in Africa, particularly in pastoralist and agropastoralist systems, through improved livestock health and productivity by: promoting the adoption and transfer of a new tsetse control technique using tsetse repellents either with/without other trypanosomiasis control techniques.

Facts & Figures

Several impacts can already be observed since the intervention started and farmers' perceptions of the technology are very positive. After nine months of having the repellent technology on the neck of their cattle the impact includes:

- A reduction in disease incidence of >90% in the coastal areas of Kenya where the technology is being tested.
- More than 90% of the farmers report that the repellent technology is effective in protecting their cattle
- 95% of participating farmers can graze their animals anywhere including in tsetse infested areas close to the park fence
- 94% of the livestock keepers report that they can graze longer in tsetse infested areas including early morning and evening when tsetse flies are the most active
- 96% sampled farmers report decrease in drug (trypanocide) use
- Body weights of the protected animals have increased significantly resulting in higher selling prices and more traction power (of the bulls)
 - ~ Protected bulls are ploughing 2-3x more land daily as reported by >60% of the farmers
 - ~ Animals are now being sold at 2-3x the price



Protected bulls plough 2–3x more land daily

- 45% of sampled farmers report that milk production has gone up 2x even though the lactating cows are native
- In the evenings, farmers have stopped lighting fires to smoke away flies from the animals
- 96% of livestock keepers report that the animals are now more settled when grazing or ploughing.
- Another positive feature is that many farmers who have not been included in the trials are demanding to be included.

The above results have been achieved despite the prototype nature of the technology (only about 70–80% dispensers working during the evaluations due to losses or damage and leakage and maintenance problems of the dispensers on cattle).

Quotes on Repellent Collars

Mwalimu M. Sheria — Zunguluka location

“Previously my bulls ploughed 1 acre per day, now I can plough 3 acres per day”

Mohammed Sheria — Zunguluka location

“Before the *icipe* collars I used to pay Kshs30,000/= to plough my 20 acres of land now I use my protected bulls and pay nothing’.

Suleiman Shee — Mangawani location

“With the collars, I can graze my cows closer to the park fence and early morning and late evening without disturbance from the flies which are most active at these times. The weight of the animals is also increasing and we can get more money by selling them. Previously we sold our animals between Kshs7–9,000/= and now we can get between Kshs20–30,000/=”.

Mwanasha H. Chinaka — Mangawani location

“The collars have no side effects to farmers and cattle; even goats and humans are protected with the collars”.

Mary Ben Nzazi — Mangawani location

“Before the collars were introduced I got 1.5 litres of milk per day now I get 3 litres. With collars we can now introduce high grade animals”

Ali Ndaru Henzi — Pengo location

“Previously, ploughing was very difficult and once even my oxen ran away with the plough due to tsetse bites. Now with the collars they can plough peacefully”.

Sabina Tsehlo — Mkongani location

“Before *icipe* came with the collars, selling price was about Kshs Kshs10–12,000/= per animal. Now with the collars and weight increase we can sell animals above Kshs35,000/=”.

Eunice Kilonzo — Kidongo location

“Previously we could not go closer to the Park fence to graze our animals especially in the evening as the animals used to run back due to tsetse bites, not now with the collars”.

Jackline Mumo — Katangani location

“We want collars not traps”.



Repellent collars in more detail. Several dispenser models have been developed and are being tested. *icipe* is working with business partners to further optimize and mass-produce these prototype repellent collars into commercial products

How Does the Repellent Technology, a Science Led Innovation Work?

The synthetic repellent and the waterbuck repellent blend work by repelling most of the flies that come to bite cattle thus significantly reducing the biting rates of the flies and consequently the disease levels in protected cattle. The repellent collars comprise of reservoirs in which the repellent compounds are put in and tygon tubing from which they are emitted. The latter is protected with a metal casing.

Strengths of the Repellent Technology

- *Mobile*: The tsetse fly repellent is the only animal-based preventive control strategy that can move with the animal, and so is particularly well suited for pastoralist systems. Although tailored for pastoralist communities, the technology is also becoming increasingly popular with sedentary livestock keepers.
- *Sustainability*: As a private good, and as there is considerable demand and willingness to pay for the product, there should be sufficient incentive for the private sector to produce and supply it.
- *Maintenance*: Would require little once fully optimized.
- *Individual farmer decision*: Fits in well with the needs of individual herders and can be evaluated by the individual according to their understanding of the costs and benefits.
- Safe and environmental-friendly with no side effects.
- *Simple to deliver and simple to use*: Repellent collars do not require special handling or technical training to use.
- Repellents can be integrated with other technologies, e.g. in a 'push-pull' strategy.
- Cattle with collars also provide protection to goats and humans.
- Cattle are also protected from other biting flies.
- *Design principle for the dispenser*: constitutes a useful model for robust commercial products.

Opportunities

- Commercialization of the repellent products.
- Integration with other tsetse and trypanosomiasis control techniques to develop improved integrated control strategies
- Roll out to other tsetse affected countries
- Protection of humans.
- Protection of safari vans and tourists from tsetse attacks in parks
- Use in barrier systems

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