

Policy Briefing

Contraceptives to manage rodent outbreaks



The AgriTT programme is an innovative trilateral initiative between the UK Department for International Development (DFID), the Chinese Government, the Governments of Malawi and Uganda and the Forum for Agricultural Research in Africa (FARA). The programme facilitates the sharing of successful experiences in agricultural development with developing countries to improve agricultural productivity and food security.

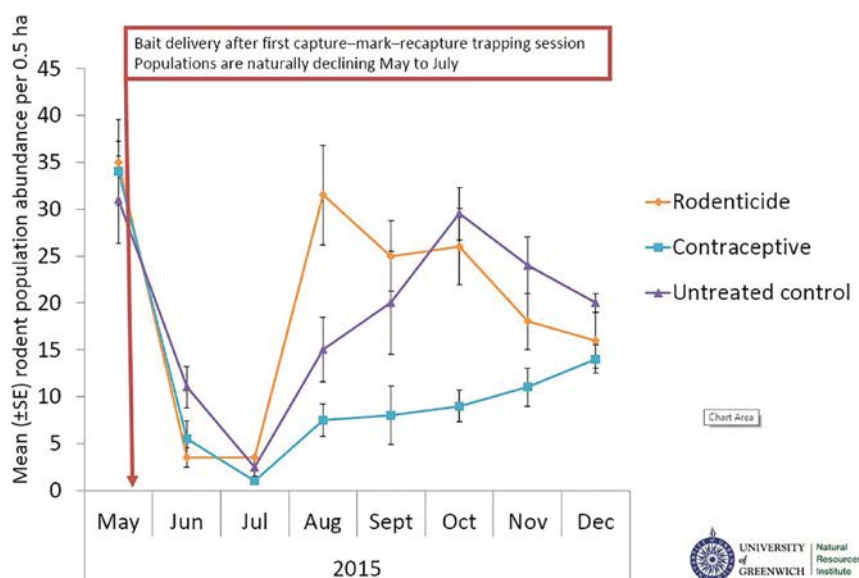
The AgriTT Research Challenge Fund supported two year research projects to generate new thinking and practice on technology transfer and value chain development. Each project had a Chinese, UK, and African or South-East Asian research partner.

Chinese fertility control technology for rats used successfully in Tanzania

Rodent population outbreaks have severe impacts on people's livelihoods in Tanzania and across sub-Saharan Africa. Such outbreaks appear to be growing in occurrence and severity with increasing climate variability. The Food and Agriculture Organization has reported that, on average, 5–15% of the maize crop in Tanzania is lost to rodents each year – enough to feed over 2 million people for a year. However, during rodent outbreaks some farming communities can lose more than 50% of their maize and 30% of their wheat and barley, with some farmers experiencing 80–100% losses during rodent outbreaks.

Fertility control has the potential to be more ecologically sound, safe and cost-effective than traditional poisons, and is used successfully to manage rodent populations in China. The hormones levonorgestrel and quinestrol (which are used in human contraceptives and hormone replacement therapies) were tested under controlled laboratory conditions to determine their effects on both males and females. Experience from China shows that different species respond to the hormones in different ways, so it could not be known in advance how the main African rodent species, the multimammate rat (*Mastomys natalensis*), would respond. The trials showed that both sexes were negatively affected and would freely consume the bait. Optimal bait uptake and fertility reduction was

Figure 1 *Mastomys natalensis* populations where cropping area is baited with rodenticide or contraceptive, or untreated



achieved with the lowest dose trialled, 10 parts per million. This dose has the least effect on the palatability of the bait, and its effectiveness is supported by previous research in China. Field trials comparing the contraceptive-laced bait were then carried out to compare it with rodenticides and with an untreated control. These trials showed that the contraceptive was far more effective than the rodenticide in regulating the population and preventing it from increasing.

For population control, fertility control of rodent pests is preferable to killing them. When some rodents in a population are killed, the survivors have access to more food. This triggers increased breeding and litter sizes, leading to population resurgence – that is, more rodents than if no action had been taken. Using fertility control, because the population is not reduced, dominant adults control the territory, preventing immigration. And as there are significantly fewer births, the population cannot grow in response to increases in food availability as the season progresses.

Environmental effects appear to be minimal. During the trials, analyses of soil samples taken next to bait stations were unable to show the presence of the hormones. Although such negative results should always be questioned, the lack of environmental contamination is supported by work in

China showing that the hormones break down very quickly in soil and water.

These trials need to be repeated across seasons and in different localities to ensure the observations are reliable and robust. They also need to be carried out alongside crop damage assessments to observe how the changes in rodent populations impact on crop damage and other livelihood indicators in different cropping contexts.

Farmer training and awareness-raising activities suggest that farmers are open to using fertility control against rodent population outbreaks. Education is needed to help farmers understand how a contraceptive bait works, and why it works to reduce rodent numbers more effectively than rodenticides. But farmers in areas that have experienced rodent population outbreaks in the past did understand that having a few rodents around is not a real problem for crop damage, and were willing to try contraceptive baits if such a product was able to prevent outbreaks from occurring.

Synergies with existing projects were maximised. This project worked alongside an ongoing EC-funded project, StopRats, which is led by NRI and involves Sokoine University of Agriculture. Further progress in activities related to the next steps of product registration will be conveyed through the website at <http://projects.nri.org/contrat>.

Policy recommendations

- **The vital next step is registration of fertility control products with the Tanzanian regulator.** While fertility control for rodents and other animals is being pursued by a number of different organisations around the world, no other institutions are looking at the specific hormone compounds investigated by this project.
- **To achieve registration will require additional data, particularly repeating trials over seasons and in different locations to ensure efficacy and to understand potential non-target and environmental effects.** Existing data from China can contribute to this, but in-country assessment will also be required. The project team is in discussions with commercial companies in Tanzania and China, as well as the Rodent Control Centre within the Ministry of Agriculture, Food and Cooperatives, with a view to securing the funding required to carry out all registration requirements to ensure the project's findings are built upon and utilised. Further research funded by the StopRats project is ongoing to help provide the essential field trial data required for registration.
- **Once the technology is licensed in Tanzania,** both the Rodent Control Centre and private commercial companies will be able to use the products to prevent the rapid breeding that leads to high rodent populations and high damage rates to crops both pre- and post-harvest.



Farmer training and awareness raising suggests Tanzanian farmers are open to the prospect of using fertility control to control rodent population outbreaks.



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