RODENT CONTROL

CURRENT PROGRESS ON THE DEVELOPMENT OF A PRACTICAL CONTROL STRATEGY FOR RURAL HOUSEHOLDS IN MOZAMBIQUE

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Report of a visit undertaken by:
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Objectives

After the rodent survey conducted in Zambezia in April 1999, it was proposed to conduct an experiment with two main objectives.

- Long-term monitoring of rodent populations within rural households to track potential changes with respect to seasonal and food availability alterations in these environments
- Assessment of the impact of intensive household rat trapping upon rodent populations in comparison to households who are not trapping

The objective of the current report is to provide a critique of the way this trapping experiment is proceeding to date and to interpret the preliminary data already acquired. Conclusive results will not be available until the end of the experiment in March 2000, when a final technical report will be produced.

Assessment Methods

Farmers from the three villages initially surveyed in April, 1999 have been involved in an intensive trapping experiment. In each village, half of the farmers involved in the initial survey and trapping visit were given 10 break-back traps to be placed in their house. These farmers (the treatment group) were told that they must set all the traps every night. A local facilitator in the village visits these households every day to record the number of rats caught and whether they are house or field rat species. The majority of farmers are baiting the traps with dried cassava, whereas a small minority use dried fish or other food baits. The other half of farmers who were involved in the initial survey and trapping visit are used to collect comparative data (the control group). Every other month the villages are visited by World Vision staff at which time control group farmers are given 10 traps each. Rats are collected daily from treatment and control group farmers over three days, and the rats caught are weighed, sexed, and speciated. At the end of the three nights of trapping, traps are collected from the control group farmers

Preliminary Results & Conclusions

In order for intensive trapping to have an impact upon the rat populations in rural households, the traps must remove rats faster than their reproduction rate. Pest management techniques such as trapping will, therefore, be most effective when pest populations are low, and the level of control will be based upon relative pest and trap densities. Our experimental design was based upon farmer estimates on the number of rats living in their roofs ranging from 50 to 100 rats and that rodent species such as *Rattus rattus* are capable of producing up to 12 young every 21 days in areas of high food availability. Trapping programmes must, therefore, be implemented at the beginning of the storage season before rat populations increase as food availability inside the house increases. Similarly, the number of traps must be high enough to account for the potential pest density experienced.

Results, so far, would support our hypotheses and suggest that intensive trapping is having a positive impact upon rodent populations in rural households. Similarly, the relative effects of overall pest density among villages are affecting our standardised trapping efficacy which uses 10 traps per household unit. In all three districts, the number of rats caught is high among farmers intensively trapping, and since the commencement of the experiment, farmers have caught between 20 to 100 rats per month, averaging between 0.2 and 2.9 rats per day (Figs 1 to 3).

Figure 1 **Mean daily number of rats caught in Morrumbala by farmers intensively trapping, May to September, 1999**

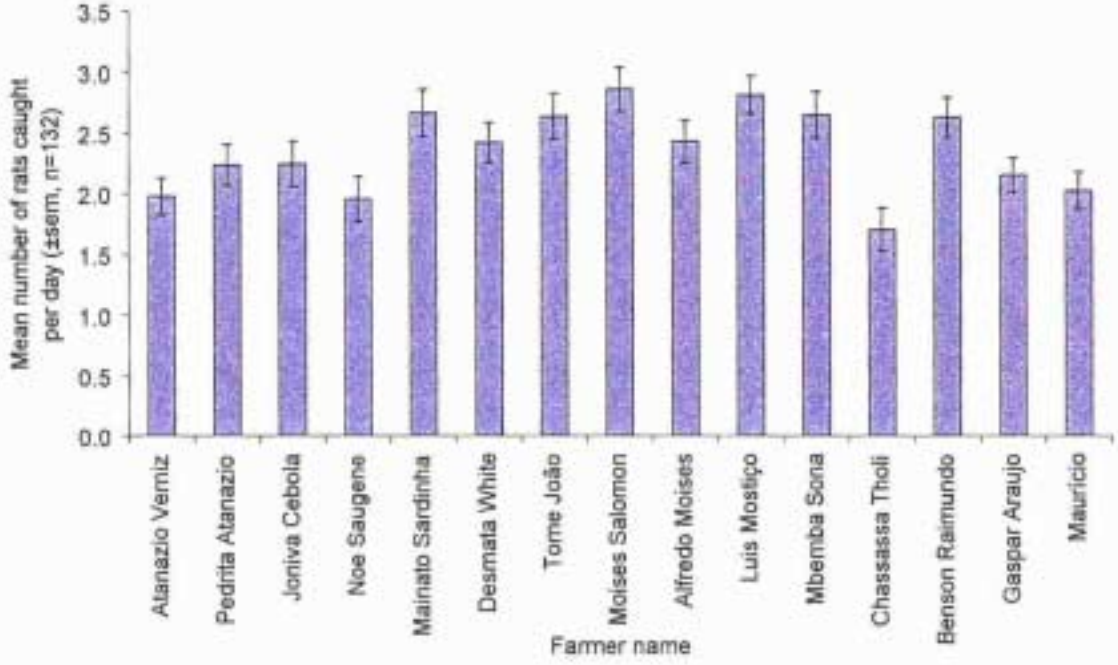


Figure 2 **Mean daily number of rats caught in Gurué by farmers intensively trapping, June to September, 1999**

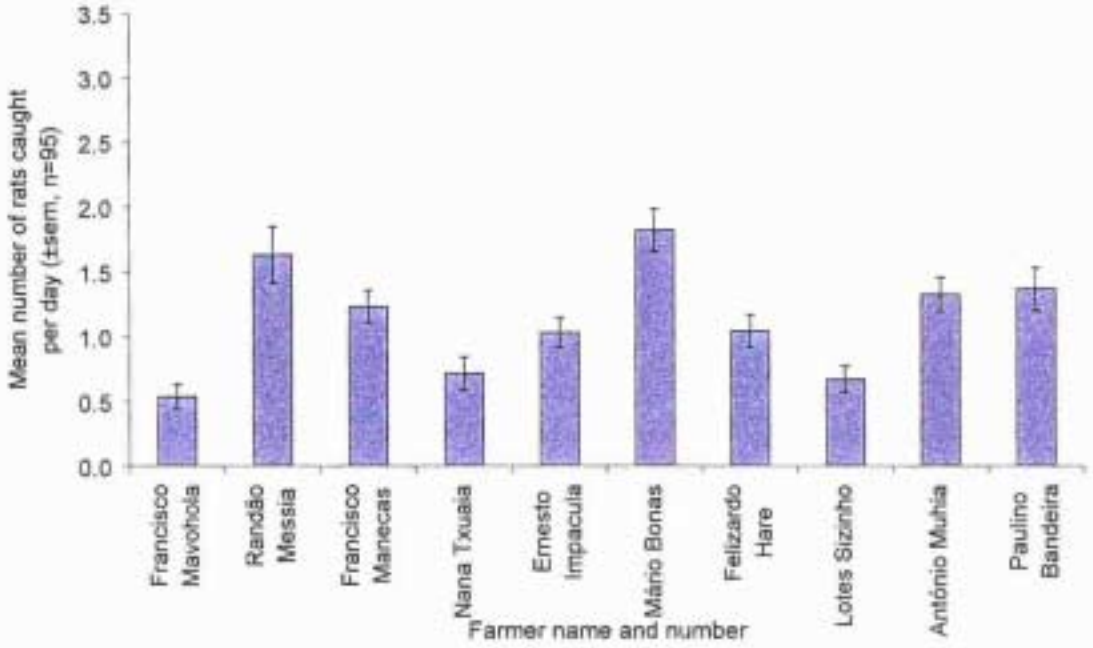
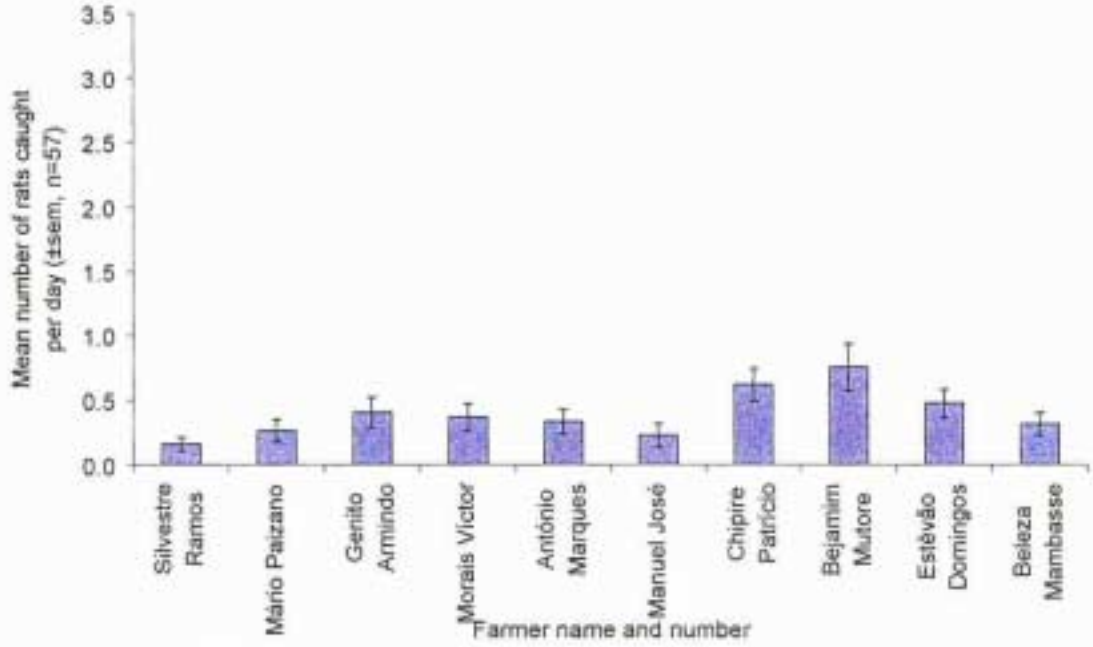


Figure 3 **Mean daily number of rats caught in Namacurra by farmers intensively trapping, July to September, 1999**



Changes in rodent population have differed among districts. In Morrumbala, pest population density has been the highest (Fig 4). Trap catch remained relatively stable at about 1.5 rats per day during the first one and half months, after which trap catch went up to between 2.5 to 3.5 rats per day. Whereas in Gurué and Namacurra, rodent population changes have been more static showing a slight downward trend in average trap catch over the monitoring period (Figs 5 & 6).

Figure 4 **Weekly number of rats caught by farmers intensively trapping in Morrumbala (n=15)**

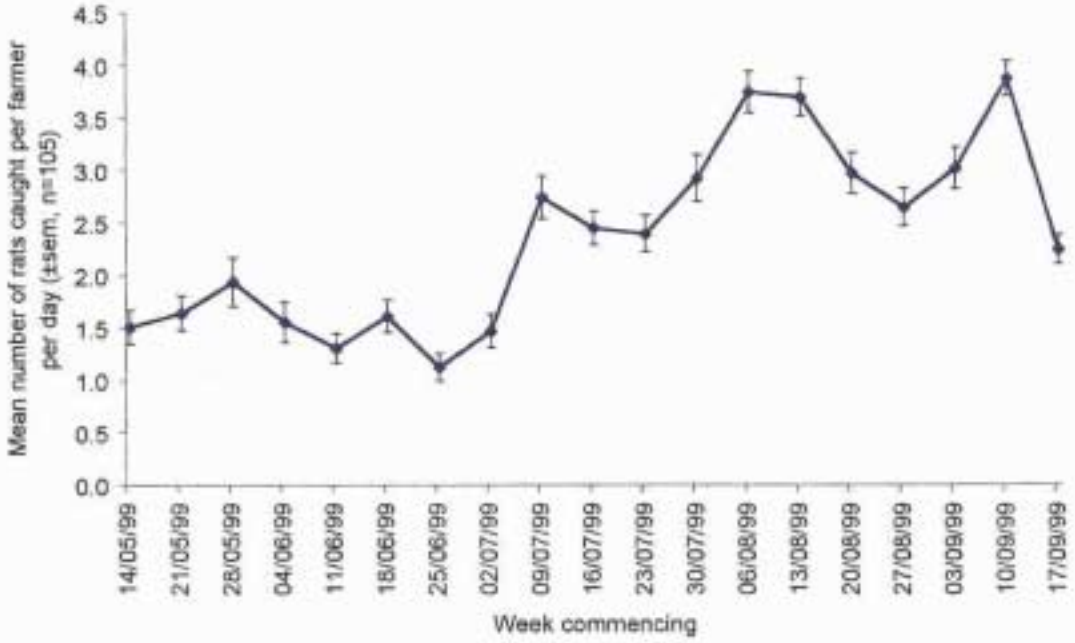


Figure 5 **Weekly number of rats caught by farmers intensively trapping in Gurué (n=10)**

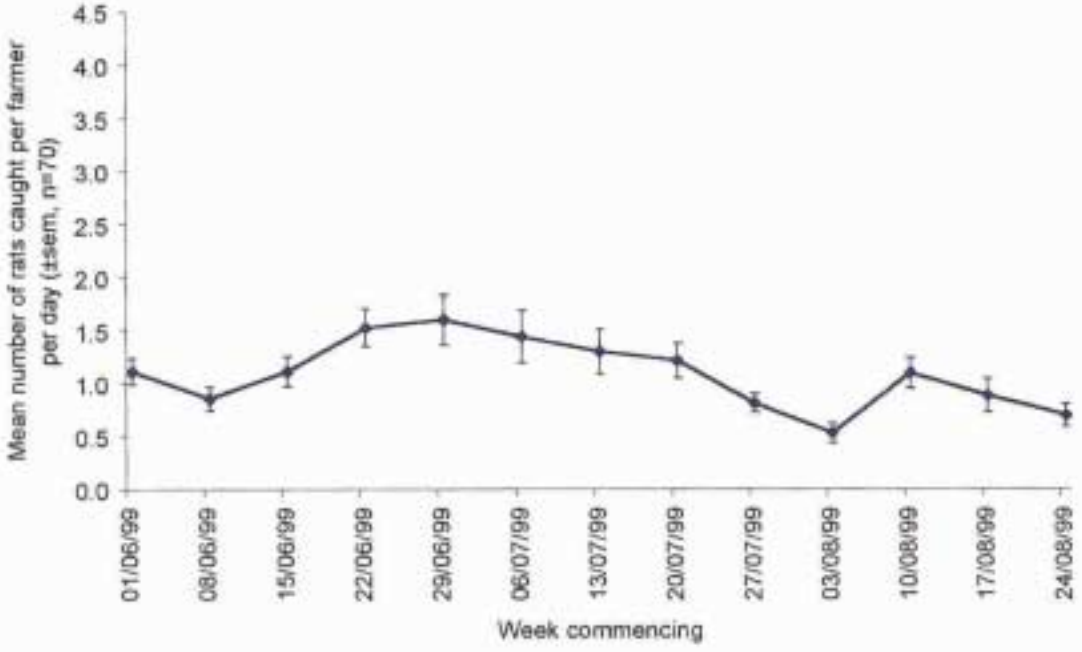
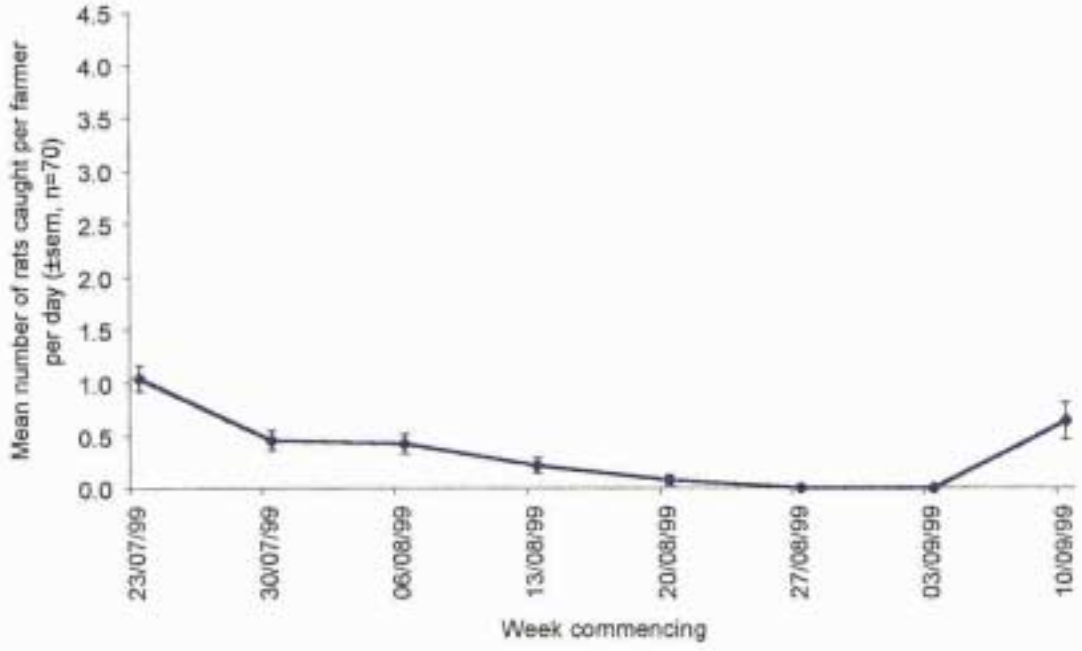


Figure 6 **Weekly number of rats caught by farmers intensively trapping in Namacurra (n=10)**



These data could suggest rodent populations are lower in Namacurra and Gurué and that trapping with ten traps per household is adequate to manage rodent populations in these districts, but this number of traps is not sufficient in the higher pest densities found in Morrumbala. However, this analysis does not fully represent the situation. Although populations continue to increase in Morrumbala with farmers who are intensively trapping, their catch must be put into perspective with respect to farmers

who are not trapping. In other words, the population may have increased more rapidly and to a higher level in the absence of trapping. This is elucidated when comparing the numbers of rodents caught between treatment and control groups of farmers.

In all three districts, farmers who have not been trapping intensively (the control group) are catching more rats per day during the three day trials than farmers who have been trapping (the treatment group) (Fig 7). To illustrate this difference, farmers assigned to the treatment and control groups before the commencement of the trapping programme were catching the same number of rats per day (Fig 8); whereas the difference in trap catch between control and treatment groups has been increasing with time showing control group farmers catch more rats (Fig 9). Combining data derived over each three day trial shows that intensive trapping is reducing the average daily catch of rats (Fig 10), and the total number of rats caught is between 40% to 50% less among treatment farmers. In other words, farmers who are not intensively trapping are catching twice as many rats. It is unlikely that this effect is due to the development of trap-shy animals among treatment farmers. Trap-shy animals would only be created when rats experience a near miss with a trap and would not be created by seeing other rats in traps. Because the traps are so sensitive, we have obtained little evidence from farmers of traps going off without a rat in them. The difference between the overall effect in Morrumbala and the effect in Gurué and Namacurra is that trapping in Gurué and Namacurra appears to be surpassing the rate of rat replacement; whereas in Morrumbala, trapping is slowing the rate of rat replacement.

Figure 7 **Photograph showing the typical difference found in the numbers of rats caught between treatment and control group farmers. The bag on the left are the rats which were collected from control farmers and the bag on the right are the rats collected from treatment farmers**

Figure 8 **Before commencement of rodent trapping experiment in Gurué comparing farmers who will be intensively trapping (treatment group) and farmers who will not be trapping (control group)**

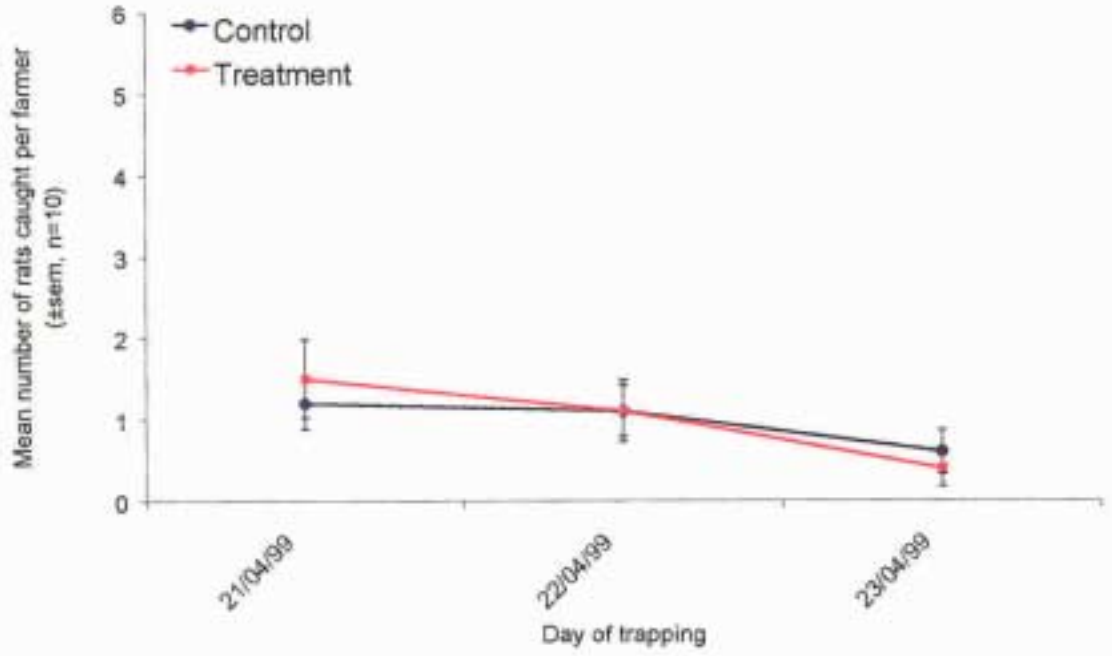


Figure 9 **Comparison of farmers in Gurué who are intensively trapping (treatment group) and farmers who are not trapping (control group) after the trial has been running five months**

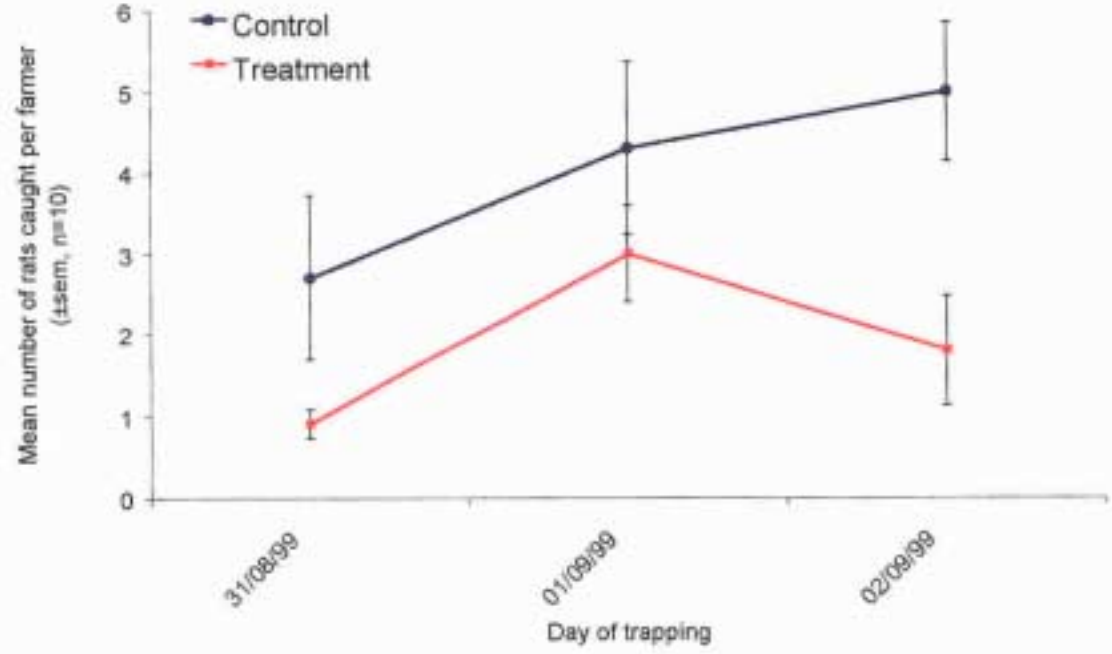
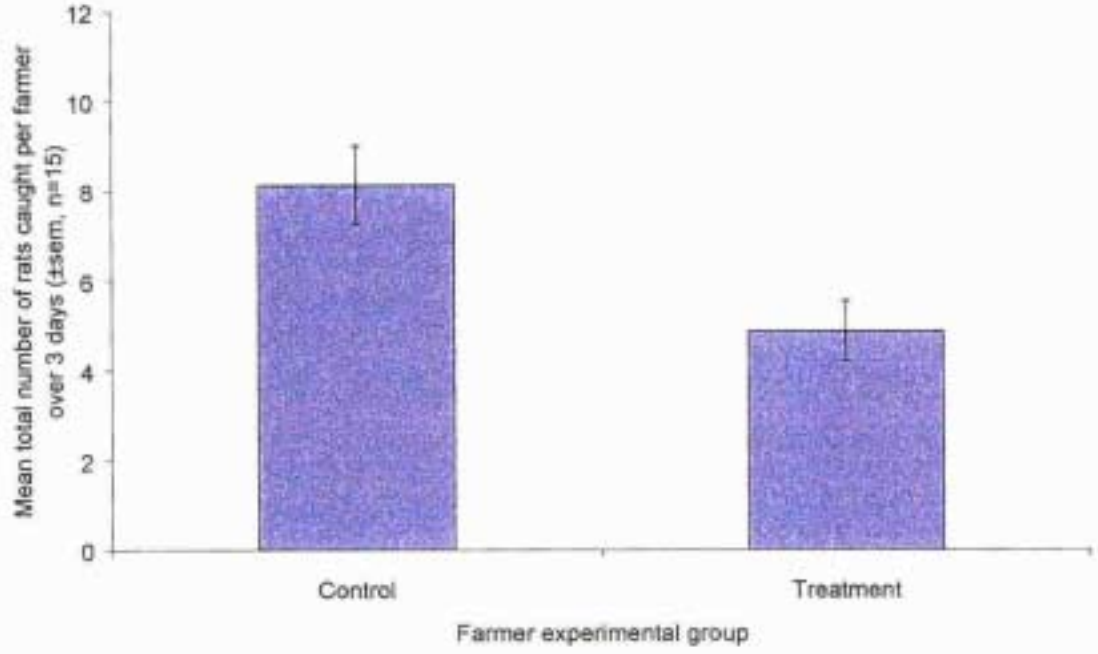
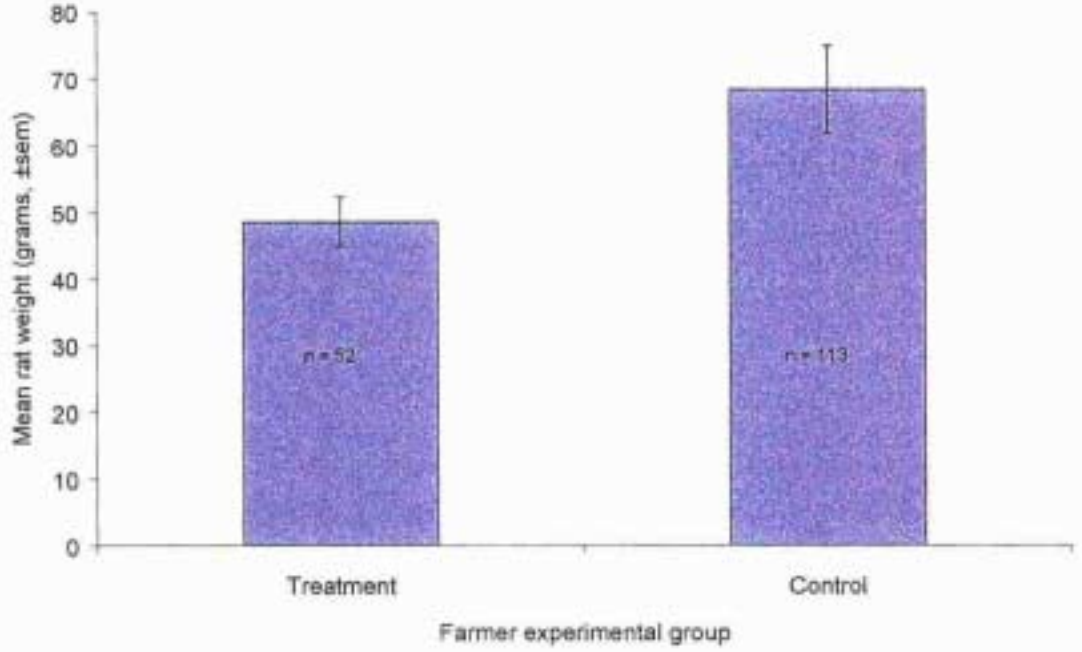


Figure 10 **Comparison of number of rats caught by control and treatment farmers in Morrumbala when the experiment has been running five months, trial period 20-22 September, 1999**



Further evidence of the impact of intensive trapping can be observed through the average weight of rats caught between treatment and control group farmers. Farmers who have been intensively trapping are catching more rats before they reach maturity, shown through the lower average weight of rats caught in their houses (Fig 11). This weight reduction implies that the reproduction rate of rats will be lower in households intensively trapping and that the overall amount of food losses due to rodents will be significantly lower.

Figure 11 **Difference in average weight between rats caught by treatment farmers and control farmers in Morrumbala during the period 20-22 September, 1999**



Evidence of changes in the proportion of field and house rats caught between treatment and control farmers could also give an indication on the impact of trapping efficacy. Many treatment farmers said that they have been increasingly catching field rats in their house (Fig 12). This could be due to reduced numbers of house rats through the trapping programme, a relative increase in the population density of field rats, environmental factors forcing field rats to increasingly scavenge inside houses or inter-specific competition for resources by different rodent species. However, to date, the data collected do not indicate any differences in species composition between treatment and control farmers, suggesting that environmental changes may be the over-riding principle affecting the proportion of species caught.

Figure 12 **Proportion of the total number of rats caught in Morrumbala belonging to the species *Rattus rattus* (the house rat)**

In conclusion, intensive trapping appears to be significantly impacting upon the number of rats living in rural households. Through several indicators, it can be shown that farmers who are trapping reduce the rat population in their house. It is still unclear how overall changes in rodent population in different districts are affecting the efficacy of the control strategy. However, it is expected that these questions will be clarified in March/April 2000 when the current trapping experiment will have completed a full agricultural cycle. If the trends reported continue throughout the year, the difference between treatment and control group farmers should become more extreme.

In all three districts, farmers involved in the trial already associate a strong value with trapping. Not only does trapping provide villagers with a much needed source of protein, but it is reducing stored food losses. Much work remains to quantify all the benefits from reducing rat populations such as reduced disease transmission. For trapping to sustainably promote itself as a major part of a rodent control strategy for rural households, a cost-benefit analysis of the situation will be required. There certainly will be costs to sustainably promote a rodent control strategy, and it remains to be seen whether the benefits will outweigh the costs. However, as farmers continue to trap, their perception of the benefits will increase, simultaneously increasing the value associated with rat control. Using a flexible and cost effective control strategy will, therefore, promote itself once implemented.

Acknowledgements

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[1] The views expressed are not necessarily those of DFID.