

## New insights to mouse behaviour

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Mice will travel several hundred metres a night in search of food, and will share burrows.

These are two of the findings from new research that is prompting a re-think of mouse control methodology.

Linton Staples, managing director of Animal Control Technologies Pty Ltd and a member of the Invasive Animals CRC team, said the new findings have implications for mouse control programs.

The fact that mice will forage over several hundred metres in a night and may be moving between burrows suggests a need to re-think the risk of re-infestation following baiting and raises questions about the benefits of treating localised areas when mice numbers are high and populations widespread, he said.

These findings may also help explain why baiting has sometimes appeared to be less effective than anticipated, and may point the way to a preventative approach to mouse control.

Results of trials to measure the field efficacy of zinc phosphide baits and determine whether or not mice were moving back into baited areas after those there had been killed suggest that applying less than the recommended 1 kg/ha of bait will not provide effective control of large mouse populations, Professor Staples said.

In trials on Eyre Peninsula last year, halving the rate to 0.5 kg/ha reduced control and accelerated the rate of re-infestation of baited areas, he said.

In one trial the 0.5 kg/ha rate gave only 30% control of a mouse population measured at 499 a hectare. Following up with another 1 kg/ha a week later gave 100% control.

In other trials in the same series, MOUSEOFF® zinc phosphide bait applied at a rate of 1 kg/ha gave from 100 to 89% control of mouse populations up to more than 500 a hectare.

The rate trials were part of a research program undertaken by Animal Control Technologies with support from the GRDC via the Invasive Animals CRC, in response to concerns that some growers



MICE WILL FIND FOOD WHEREVER THEY CAN, WHETHER IN SHEDS (PICTURED) OR IN PADDOCKS, WHERE THEY WILL FORAGE OVER SEVERAL HUNDRED METRES IN A NIGHT.

had needed to bait more than once to control mouse populations, even though a kilogram of zinc phosphide bait can theoretically kill more than 10,000 mice and most locations have peak mouse populations of 300 to 900 a hectare.

Results from the research suggest apparent control failures have been a product of feeding rates and mouse mobility.

The ACTA researchers found that 1kg/ha of zinc phosphide bait applied in crop consistently gave more than 90% control of the population present when the bait was applied, but that mice from adjacent un-baited areas moved into baited paddocks, often within a week of baiting.

In one instance last autumn, when there was a widespread mouse population of more than 500 a hectare, four mice were re-captured seven kilometres from where they had been captured and released a month earlier, Professor Staples said.

In previous work, a tagged mouse was found 630 metres from the point of release two nights later. Another travelled 725 metres over 10 days and 11 mice were recaptured more than 300 metres away within one night.

The researchers also found 'new' mice were entering areas after local mice had been tagged, suggesting that, when feed is

short and mouse numbers high, re-infiltration of baited areas is highly likely, he said.

"The more food available, the less distance mice will need to move. The higher the density, the greater potential for mice to spread.

"Our previous thoughts on 50-metre buffer zones within paddocks do not hold when feed is short and population densities are high.

"Until now we thought mice would travel not much more than 50 or 100 metres from their nests to look for food and that the bait was so good only high-risk paddocks needed to be treated, but it seems mice are moving from hole to hole and will forage over large distances if numbers are high and food is short.

"These findings mean we need to develop strategies to prevent reinfestation of baited areas, which could involve follow-up perimeter baiting of baited crops to prevent reinfestation.

"The risk of reinfestation when there are high mouse populations around treated areas may mean we need to plan for baiting a buffer zone of perhaps at least 100 metres outside of the crop to protect it.

"The label [on zinc phosphide baits] allows for this if the buffer area is pasture

or another approved crop.”

At the standard rate of 1 kg/ha of zinc phosphide bait, many of the mice entering baited areas will be killed by bait from the initial application, he said, but the extent to which this happens will be influenced by mouse numbers and how much bait is eaten by each of the mice in the paddock when the bait is applied.

“Just one or two grains of zinc phosphide bait will kill a mouse and a kilogram of the product contains enough grains to kill up to 10,000 mice; provided each animal eats a minimum lethal dose. However, it appears that many mice eat more than a lethal dose before they die.”

In a series of controlled no-choice feeding studies, in which mice were provided with unlimited access to MOUSEOFF®, they continued feeding for up to four hours after the first grain of bait was eaten, consuming an average of nine grains before they stopped feeding due to the effects of the bait. Actual consumption by individual animals ranged from two to 25 grains.

Work is now underway to determine how many grains of bait mice eat in the field.

The laboratory consumption data prompted the researchers to look at the effect of doubling the application rate, but they found this did not improve control or affect the level of reinfestation, probably because, with twice as many grains of bait per square metre, the animals simply ate twice as much before they died, Professor Staples said.

“Mice from unbaited areas can move into a baited paddock within a week, so current knowledge suggests farmers will get the best results from using the recommended rate of 1 kg/ha and re-baiting any ‘hot spots’ of high mouse populations found a week or so after the

initial application.

“In extreme situations, baiting twice will provide better results than doubling the rate in a single application.

“And given the level of re-infestation that can occur, growers would be well advised to think about a whole-of-farm approach to baiting when mice numbers are high across the landscape.

“Synchronising baiting with neighbours is likely to minimise the risk of mice moving between farms.”

The research results suggest there may also be value in a taking preventative approach while mouse numbers are relatively low, he said.

### Mixing bait with other chemicals poses a number of risks.

ACTA has also been exploring how to reduce bait spreading costs, including whether or not baits such as MOUSEOFF® can be applied effectively with other inputs such as fertiliser, which would eliminate bait-spreading costs at seeding time.

However, mixing bait with other chemicals poses a number of risks and generally should be avoided, Professor Staples said.

“There are significant risks that urea or superphosphate will react with and degrade zinc phosphide and that lime will delay death by buffering the bait against mouse stomach acids.

“And bait grains contaminated with fertiliser, especially urea, may be less palatable to mice, reducing the bait’s effectiveness. In one trial, mixing bait with urea reduced palatability by more than 60%.”

An alternative that enables bait to be spread at seeding but avoids mixing the bait and fertiliser is to add an accurately metered spreader to the seeding rig so bait can be applied in the seeding pass.

According to the GRDC ‘Mouse Control’ Fact Sheet, the combination of more intensive cropping rotations and conservation farming practices such as stubble retention has seen the frequency of mouse plagues increase from every five to six years to every four years, so there are more mice for any given set of seasonal conditions.

Hygiene and management can help reduce mice numbers, the fact sheet authors say, but baiting is the only in-crop control.

Growers should monitor mouse populations in their paddocks over autumn and, if autumn numbers are high, continue monitoring into the growing season, paying particular attention to paddocks where mice were noticed at harvest or during seeding.

Indicators of mouse activity include:

- burrows and active holes;
- mouse droppings on soil and plants and a ‘mousey’ smell
- large numbers of mice in paddocks or on roads at night
- frequent daytime sightings
- more birds of prey than normal
- signs of seeds being dug up, plants – including weeds - being gnawed or pod and head damage.

Mouse numbers can be estimated based on the number caught in ‘snap traps’ or, when food supplies are low, the feeding damage to cardboard ‘census cards’ soaked in canola oil.



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