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## Pest control

# Guarding grain

Unlike Roland Rat, Mickey Mouse or Jiminy Cricket, most rodents and insects are an unwelcome sight in grain stores, leading to a multitude of issues including grain being rejected. CPM investigates what can be done to achieve control over these pesky pests.

By *Melanie Jenkins*

Each growing season, crops can face a number of pests within the field and while the move away from insecticides has heralded a focus on more integrated approaches, pest control doesn't stop at the combine, with the grain store providing a veritable feast for a whole host of rodents and critters.

Not only are there primary feeders to contend with, there are also secondary feeders, mould feeders and scavengers, says Pelsis' John Stewart. "It's almost a small ecosystem when you start looking at it in any real detail. It's hard to quantify the value

of the losses sustained this way because not a lot of research has been done, but it can cost some farmers quite a lot."

Rodents are one of the biggest threats to grain once it's in store, warns John. "These are a primary consumer of grains but their droppings, urine and hairs are further contaminants. It's also estimated that around 5% of all fires on farm are caused by rodents chewing through wires and machinery."

### Winter warning

Rodents are likely to become more of an issue as temperatures fall and conditions outside become harsher, he adds.

Other primary pests associated with stored grain include insects such as the saw-toothed grain beetle, rust-red grain beetle, grain weevil, foreign grain beetle, the flour mite, cosmopolitan food mite, lesser grain borer and rice weevil. "As primary pests, these can attack the actual seed to obtain access to the germ," says John.

"Grain doesn't have to be milled for them to attack it and once they have, this can result in raised temperatures within the grain and an increase in relative humidity, which is a farmer's worst enemy because it promotes mould and mycotoxins, leading to grain being discarded."

Insects can become an issue incredibly quickly, according to AHDB's Kristina Grenz. "Grain borers and weevils can spread rapidly and cause very serious issues that

can result in further pest problems which are detailed in AHDB's grain storage guide."

Secondary feeders, which include the brown house moth, white-shouldered house moth, hairy fungus beetle, white-marked spider beetle, mould beetle, plaster beetle, flower beetle and booklice, don't directly attack grain but can feed on it once it's been damaged by primary feeders, explains John. "The insect carcasses can also result in the grain being downgraded or rejected – it's a constant war with nature."

It's also advisable to be aware of the



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issues birds can cause, adds Kristina. “These aren’t necessarily directly damaging the grain, and may be feeding off the insects and mites, but their excrement can result in issues such as salmonella in the grain.”

In terms of the effects of grain store pests on farmers’ businesses, these can be both the physical loss via consumption and a reduction in quality and tainting, as well as potential mould growth and the loss of nutritional value where the wheat germ has been consumed by larvae, highlights John.

“And all the effort put into establishing, growing and harvesting a crop only for it to be damaged during storage means a lot of time has been wasted.”

Other factors to consider are the effects further down the food chain, risks to health and safety and the environment, plus the cost of pest control to treat infestations and prevent further issues, he adds.

Kristina also warns that issues with grain as a result of pest damage or contamination can mar a farmer’s reputation with their grain buyer. “It can all have a cascading effect that ultimately results in cumulative costs to the farmer.”

The first and foremost advice to manage grain store pests is to prevent them in the first place, says Frontier’s Dr Paul Fogg. “Our advice always starts pre-harvest because once grain is in store, if there are issues, it’s ten times harder and more expensive to do anything about them.”

## Regular inspections

It’s important to make grain stores as inhospitable to pests as possible, says John. “This means understanding the biology, requirements and capabilities of these pests and having regular inspections to plug or fix any gaps or holes in the fabrication. Mice, for example, can fit through a gap 6mm in diameter, that’s the size of a biro pen, so you have to be working to an intricate level of detail.

“Using 5mm galvanised weld mesh and concrete, placing sheet metal across gaps and blocking up around pipework are all steps that can be taken to prevent access to the building,” he advises. “Also consider putting a steel band 30cm up the outside of the shed to prevent rodents climbing above this. Once they have access, rodents tend to harbour in wall cavities and emerge at



*ABOVE: Rodents, including rats, are a primary consumer of grain but their droppings, urine and hairs are further contaminants. LEFT: A wide variety of insects can cause issues in grain stores including primary feeders which directly damage grain and secondary feeders that eat this damaged grain.*



night to feed.”

John also suggests removing redundant machinery, pallets, or other harbourage

from the sides of stores to limit where rodents can nest nearby. “Ideally, buildings should be surrounded by concrete so that it’s easy to clean spillages, but the next best option if concrete is too expensive is to use geotextile and place stones 1m out from the building to prevent burrowing.

“It’s also worth increasing external lighting as this will discourage rodents from running under lit areas because of the increased risk of them being predated by creatures such as owls.”

Further steps to take include having a thorough staff clean-up and reporting policy, removing free-standing water and improving drainage, as well as not opening the shed door. “Ensure that if your staff see rodents, they report it immediately so they can be dealt with right away because the longer there’s an infestation, the more damage there’ll be.

“Rats and mice can proliferate at a fast rate, and while rats take longer to sexually mature and have fewer offspring than mice, both have a gestation period of 21 days, meaning infestation growth can be exponential,” he warns. “But these pests don’t tend to coincide because rats are more aggressive and will kill mice.”

Whereas many farmers will be familiar that the best way to reduce the chances of insect infestations prior to grain storage, is to clean the shed thoroughly, says John. “Remove any material and sanitise the entire shed with a biocide to kill fungus growth. Remember to start at height and work your way down to the ground, but be aware that some issues are airborne, so using airlines isn’t advised.”

Paul concurs, adding that it’s essential to implement good hygiene and fumigation around two months prior to anything going into the shed. “It’s also vital to dry and cool grain as quickly as possible before placing it in long-term storage – ideally grain should be at 5-6°C and then it’s a case of constant monitoring.”

But if pests do become an issue while grain is in store, it’s vital to achieve control as soon as possible. There are a number of physical traps available to deal with rodents, including smart-enabled options which have remote sensors that can trigger alerts to phones or via email, says John. “These can even be set up to trigger technicians or be focused on certain areas around the building.”

## Termination

Other traps kill rodents outright – some such as the Quadro box can kill four from one base station, while others use electrocution or gas to kill up to 20 animals, explains John. “Be aware that rats exhibit a behaviour called neophobia, which



means they are wary and averse to new objects and so it can take them 7-14 days before they'll explore something new."

Pheromone or baited traps are a further option, but live rodents may have to be dealt with after they're caught, says Paul. "You also require the correct training to use the right products in these, to avoid catching non-target species."

It's also important to ensure that any products used in baited traps don't contain allergens that could contaminate the grain and cause issues further down the food chain, warns Kristina. "Take a holistic approach and consider where your grain will be used and how any products could impact that."

For those opting to employ chemical controls, it's important to avoid the risks of secondary poisoning, warns John. "If a rodent consumes an anti-coagulant and it's then eaten by a raptor, this will poison the raptor. So it's really important to first undertake a risk assessment and then collect rodent carcasses."

"Another issue with these is that after rodents have consumed them, they can die on the grain resulting in further contamination issues. It's also difficult to use anti-coagulants once there's grain in the store because there's too much food competition for the anti-coagulants to be appealing."

"Issues are likely to be worse on livestock farms – especially pig farms – and this might mean that alternative control methods are required to avoid cross-contamination of pest control products with livestock," he adds.



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But one of the most effective tools for dealing with rodents comes in the form of man's best friend. "Terriers are very useful to help manage rodent infestations and they're unlikely to have negative impacts," says John.

Although there are a whole range of insect and mite pests, the options for controlling these are limited, explains Paul. "Pyrethroid insecticides can be used but be aware that they are only applied to the surface of the grain. To achieve control beyond this you're likely going to have to employ specialist help which is expensive."

Kristina suggests using residual insecticides or add-mixtures to the grain. "But be aware that these aren't instant solutions and at lower temperatures the residuals take longer to work."

It's also worth considering whether the use of an insecticide could impact the Sustainable Farming Incentive, she adds. "As far as we're aware, growers are able to use insecticides in store, but the guidance isn't clear. The government webpage states, 'You mustn't apply any plant protection products, including seed dressings, containing insecticide on land entered into this action'. This implies that farmers can apply to the grain store as this isn't the 'land' they're entering into SFI."

## Thorough fumigation

When it comes to tackling insect or mite infestations, fumigation is the only thorough solution, says John. "You can attempt control by managing the temperature and relative humidity of the storage environment, but be aware that each insect has its own preference."

And, fumigation must be undertaken by an accredited firm and only works in the right scenario, warns Kristina. "Before you resort to any chemical solution, ensure you're using CRD-approved products and that these are applied at the appropriate dose rate to avoid resistance developing. Also check that what you're using is suitable for your end



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market – you don't want to apply something and find out afterwards that it prohibits your grain from being sold as originally intended."

There are exams farmers can take which permit them to buy rodenticides and anti-coagulant products, and educate them on the most effective proofing materials, says John. "Buying the correct products in the first place can save you both time and money. But if you choose to bring in a pest controller, they'll survey your site, identifying any proofing work that's required, what mitigating action can be taken, and implement mechanical or chemical control."

Whatever approach farmers take, it's important to keep a thorough record of the actions taken, both preventative and reactive, adds John. "Create a thorough risk assessment, have a lockable pesticide store and demonstrate what actions have been taken and that they've been done safely and effectively." ■

## Glue board ban

As of 31 July 2024, a ban on glue board traps was introduced meaning it's now against the law to use them to catch rodents, unless the user has a licence. While some farmers might have employed this tool in the past, Pelsis' John Stewart doesn't believe the ban is of particular concern because the level of dust in grain stores often made the traps inefficient.

"There were also concerns regarding the traps catching non-target species, even barn owls on some occasions. It's more important to target ingress issues rather than just dealing with the present pests, and there are far better alternatives than glue boards which are a last resort."