# CODE OF PRACTICE FOR THE PREVENTION OF RODENT INFESTATIONS IN POULTRY FLOCKS

## The Control of Salmonella

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## 1. Introduction

Rats and mice are commonly found in or around poultry units. They pose a number of problems including a threat to salmonella control. Published work in the USA and the results of testing mice in Great Britain has confirmed infection with *Salmonella enteritidis.* Rodent eradication and prevention of infestations should be included as part of the unit and flock management and, if the strategy is to be successful, it must be planned and adequate resources committed to it.

In practice this means either training unit staff to carry out the work, ensuring that they are provided with adequate material, equipment and time to undertake the task, or alternatively to employ the services of a professional pest contractor. With the latter option there still remains a need for unit management to have an understanding of rodent biology and behaviour, to make regular inspections and be familiar with the appropriate control techniques and other measures.

### Aims of the Code

The objectives are to provide flock owners, holding managers and their advisers with the information necessary to:

- **quantify the significance of infestation problems**
- **enable the planning of control strategies**
- **assist with the implementation of control action**
- **identify the need for preventative measures**
- **ensure that the relevant pesticide and other legislation is complied with.**

The aim is to prevent rodent infestations becoming established by linking a treatment programme to regular monitoring. The control strategy will vary according to whether action is needed whilst the birds are occupying the buildings or at the end of the cycle when de-population, cleaning and disinfection is carried out. The combination of hygiene and proofing measures will make a valuable contribution to the long term prevention of rodent infestations.

### Problem species

Two rodent species are likely to cause problems in poultry units – the house mouse, *Mus domesticus* and the brown or Norway rat, *Rattus norvegicus.*

In the context of salmonella control the house mouse is the most important due mainly to its habits of living in close proximity to poultry flocks and its ability to move within, and between, buildings and structures. The favourable environment found in poultry units encourages mouse infestations and can lead to high population levels.

The common rat may also cause problems in buildings and surrounding areas. Its larger size can restrict its movements and establishment within poultry units but given a favourable environment, it can become a significant problem. Its role in the transmission of disease is uncertain but the potential must not be overlooked.

The two species vary considerably in their physical characteristics and behaviour and where appropriate these are dealt with separately when they are relevant to the choice and application of control measures.

Rodent control programmes can be effective if the points covered in this Code are taken into account.

## 2. Significance of infestation

**2.1**

Rodents are capable of transmitting disease to both humans and livestock. They can carry and excrete salmonella and may therefore be a means of its introduction onto and spread within a unit. They might also have a role in the transmission of other infectious diseases such as fowl cholera and erysipelas.

Staff may be at risk from other harmful organisms such as leptospira (the cause of Weil's Disease) if they come into contact with rodents or contaminated surfaces and equipment. Micro-organisms are included in the Control of Substances Hazardous to Health Regulations (COSHH) so there is a legal requirement to consider the risk and hazards posed by such organisms and to take appropriate action to protect humans.

**2.2**

The gnawing abilities of rodents will threaten the structure of buildings, materials such as thermal insulation and any other vulnerable materials. Damage to cable insulation can lead to electrocution risks, fire hazards and may contribute to equipment breakdown including ventilation systems and food handling facilities.

**2.3**

Rodents can consume significant quantities of expensive compound foodstuffs when high populations are present while contamination by urine and droppings may reduce its palatability and increase the risk of disease.

**2.4**

The presence of rodents may compromise quality standards demanded by customers particularly where pest free status is a contractual requirement.

## 3. Biology and characteristics

### 3.1 Basic requirements

A number of factors affect the successful establishment of rodents and influence the level of infestation within the unit.

**Rodents need:**

**a) food**

**b) a safe environment (otherwise known as "harbourage")**

**c) nest sites and materials**

**d) water.**

The habitat offered by the typical poultry building often produces optimum conditions for rodents (particularly house mice). This includes a constant environment with a warm temperature, freedom from disturbance or threats and encouragement of the largely nocturnal activities of rats and mice.

There are plentiful supplies of high quality, nutritious foodstuffs that the rodents can obtain directly from stores, conveyors or hoppers and as a result of spillages.

Fresh water is always available and although house mice do not require a free moisture source in order to survive, they will exploit such supplies.

Wall cavities, roof spaces and voids created between floors and other sections of the building structure will generally provide a safe environment. Rats will exploit areas that may be available in outdoor locations which adjoin buildings. These will include rubbish, stored materials, patches of vegetation and ditches, banks or hedgerows.

Droppings pits and slatted areas also provide a safe environment for mice and rats that will burrow and live within these accumulations. A build up of waste material on other parts of the structure such as beams, ledges and pillars also offer habitat. The combination of feathers and droppings provide ideal nest materials.

### 3.2 Living and movement patterns

Rats and mice live in family groups and will defend their territories against intruders. However, there are differences between the two species that need to be understood.

**House mouse**

Mice will generally occupy the structure of the building although they can be found around perimeter areas and, less frequently, in hedgerows or other adjacent habitats.

They occupy small territories which means that a large number of discrete family groups may exist within typical harbourages and will live independently of each other. When the population density is high and food and water are readily available the territory occupied by each individual group is smaller.

**Common rat**

Rats are usually found both indoors and outdoors. Although they may live within buildings or other structures they normally excavate burrows around the perimeter of buildings or in nearby ditches, hedgerows and the cover provided by rubbish, equipment or other materials.

Drainage systems or other similar structures such as ducting are also exploited. They will develop regularly used routes to enable them to travel from where they are living to sources of food.

Rats will move into farm buildings in the autumn and winter when the weather is cold and wet and food is less readily available following harvest. This is important with regard to the timing and planning of control measures.

Rats and mice will readily move from a location when disturbed and the removal of food sources and cleaning of units will encourage them to seek alternative sites. This may help spread infestations resulting in the possibility of the transmission of disease and other problems.

**Inadequate emphasis on rodent control during turn-round periods can allow rats and mice to survive, particularly if they are protected within the structure of buildings. They then form the nucleus of future infestations and may be a source of carry-over for salmonella.**

### 3.3 Behavioural characteristics

Because rats and mice differ considerably in their general behaviour different rodenticide bait techniques will be needed.

Mice live in small social groups and their erratic feeding behaviour results in them visiting several different food sources during periods of activity so it is necessary to provide an adequate number of bait points. It is also necessary to move the baits regularly within a location to maintain the mice's interest and achieve more effective control. However, where there is evidence that they are taking an interest in particular baits they should be left in the same place.

In contrast, rats exhibit behaviour known as 'New Object Reaction' or neophobia. This makes them suspicious of anything introduced into their territories and as a result it may take several days before they are prepared to investigate such items. In practice, this often means that they are slow to start feeding on rodenticide baits and a delay must be expected in bait acceptance.

### 3.4 Physical characteristics

The physical abilities of rats and mice are considerable and should not be underestimated when planning and implementing control measures.

Both species are capable of gnawing a range of materials including wood, soft metals and plastics. They are able to climb vertical, relatively smooth surfaces and cross structures such as horizontal wires and cables. Entry to buildings is gained through small gaps and they are able to jump significant distances and to burrow. They are also able to swim.

Rats and mice have a significant breeding potential. Adult rodents are able to produce young every 24-28 days which can lead to a very rapid increase in a population, particularly when the environmental circumstances are favourable.

### 3.5 Rodenticide resistance

The existence of so called 'super' rats and mice which are able to survive doses of a particular rodenticide that would normally be expected to kill them, is often quoted as the reason for the

failure of treatment. However, it is more likely that factors such as poor techniques in applying and monitoring baiting measures are to blame for a lapse of effective control.

Nevertheless, a genetic resistance to anti-coagulant compounds is present in some rat and mouse populations. It is important to understand that rodents are either born susceptible or resistant and cannot acquire this characteristic during their lifetime.

Resistance to the first generation anti-coagulants such as Warfarin is widespread in house mice and so the use of these compounds against mice is not recommended.

The situation with regard to rats is less clearly defined and confirmed pockets of resistance have been identified in various parts of the country. Where there are problems with the efficacy of first generation compounds it is advisable to use the second generation products taking into account user safety and conditions for their approval.

The pattern of resistance is constantly changing and will influence future control strategies.

## 4. Site and risk assessments

### 4.1 Inspections and surveys

Before control action is taken, it is vital for the flock manager to have a full survey of the site undertaken. This needs to be carried out by competent personnel and should be repeated periodically in order to monitor the situation. It includes checking the progress of treatments against current infestations to enable a prompt response to any new problems. It must include all buildings and structures within the unit and any outdoor locations and habitats such as boundary hedgerows and ditches. In respect of rats it may also be necessary to make checks on the possibility of animals moving in from neighbouring properties.

**The objectives of such an inspection are to:**

- **identify the species of rodents involved**
- **assess the extent and level of infestation**
- **identify where rats and mice are living, travelling and feeding**
- **identify any factors which might have an influence on control action such as adverse site conditions and specific risks to non-target animals including stock and wildlife**
- **identify deficiencies in proofing and hygiene measures.**

### 4.2 Inspection procedures

Each area should be systematically inspected for signs of rodents or any other aspects relevant to control activities and these findings should be noted. A site plan of the main buildings and features within the site and a sketch of the internal structure of each unit will help to ensure that accurate details are recorded and this information can then be used when control treatments are undertaken.

Site staff should be consulted and their observations included as part of the survey. All holdings should maintain a "pest book" in which to record rodent sightings and other relevant information. This should be checked whenever an inspection is made.

A powerful torch is essential when inspecting buildings to be able to check all areas including dark recesses, behind structures and in locations such as roof spaces where access is possible.

These activities inevitably involve handling surfaces which rodents may have contaminated and so suitable, waterproof gloves should be worn in addition to the protective clothing required by the holding. Other precautions are described in Section 7.

Particular attention should be paid to the following areas and situations:

**Buildings**

- **Food and egg stores**
- **Hoppers and feeders**
- **The presence of spillages**
- **Storage areas within units which may contain harbourage materials such as egg trays, boxes and equipment**
- **Hollow walls, partitions, roof spaces or any other voids, particularly where thermal insulation is involved**
- **Electrical control panels and junction boxes, conduits for wiring systems**
- **Litter and droppings pits**
- **Equipment within areas occupied by the birds such as automatic nest collection and nest boxes which provide rodents with a safe environment**
- **Any faults in building structures which might permit rodent access**
- **Any other access routes such as gaps beneath or round doors, fan housing and service entry points**

**Outdoor locations**

- **Accumulations of materials, especially those close to buildings**
- **Incinerator and rubbish disposal sites**
- **Areas of vegetation or undergrowth**
- **Ditches, hedgerows or banks**
- **Drainage systems and associated equipment**
- **Neighbouring sources of infestation**

### 4.3 Traces and signs

Both rats and mice leave characteristic evidence of their presence and this will be useful for assessing the size and distribution of infestations. Rodents are largely nocturnal and so a combination of these signs has to be employed in the initial assessment of infestation and when evaluating the results of control action.

#### a) Droppings

Rats will usually deposit droppings at specific locations near their territory and these are often found behind structures or objects that provide cover and security. They are approximately 12 mm (1/2 inch) long, elliptical in shape and when fresh can be distinguished by their moist, shiny appearance.

Mice will leave droppings throughout their territory, depositing them on the horizontal surfaces over which they are moving. These are much smaller about 3-7 mm (1/4 inch) long and are spindle shaped.

#### b) Smear marks

The natural grease on the bodies of rodents will attract dirt which will be deposited at various locations that are used regularly by rats and mice. These appear as dark marks that are commonly found in association with holes in structures, over ledges or along pipes, cables or other obstructions which are used by rodents in their travels. The smears may remain for many months (or even years) after they have been deposited so their presence needs to be linked to other signs of infestation to ensure that information on the current status of rodents within the particular location is accurate.

Mice will urinate at specific locations and the combination of urine with dust or other solid material leads to the creation of small pillars that are often found on pipes, cables and ledges used as regular, main movement routes. Such signs indicate long-standing, heavy mouse infestations but they may also remain for long periods of time and their presence should be treated with caution when assessing current rodent activity.

#### c) Footprints

Prints may be found in mud or dust at ground level or in dust accumulations on structures such as beams and ledges. Such signs can provide useful information on the general location and movement of rodents but should not be used to estimate the numbers involved.

#### d) Run and burrows

Rats will create regular, well worn tracks that are usually found protected by cover such as vegetation or are close to the walls of buildings or other structures. They are often connected to burrows that have been excavated in ditches, banks or in other areas adjacent to buildings.

Mice burrow less commonly although holes in earth floors and around the perimeter of buildings can indicate their presence. As mice usually live within structures or other similar places their activities can be identified by holes gnawed in features such as panels or cladding, often at wall and ceiling intersections. Access may be gained via faults in areas such as concrete floors and block work. Particular attention should be paid to wall areas around control panels or other similar items of equipment where it may be possible for mice to gain access via entry points cut for cables or other services. Chewed thermal insulation

material is often associated with holes in the walls and roofs of buildings. Tunnel entrances in litter or accumulations of droppings may indicate burrowing activity by mice or rats.

**e) Damage**

Identifying gnawing of building structures or similar damage to associated equipment can be useful in quantifying rodent activity. It is also important to locate damage to electrical cabling because of the risks involved. The discovery of chewed materials found when investigating accumulations of rubbish or other vulnerable materials such as bales of wood shavings, paper sacks or egg trays can also provide important information on the activities and distribution of rodents.

**f) Nest sites**

Rodents may make nests from any available materials. Particular attention should be paid to areas where droppings might accumulate on ledges or other structures and these can often reveal the presence of nests, particularly where mouse infestations are heavy.

**g) Other signs**

Reports of rodent sightings or presence need to be treated with caution as the information may be unreliable. Other signs can include the pungent unique smell that is present with heavy mouse infestations and to a lesser extent, where rats are involved. Where bulk storage of grain co-incides with rat infestations there may also be evidence of tail marks on the surface of the grain.

## 5. Control techniques

### 5.1 Choice and use of rodenticides

The appropriate techniques for controlling most rodent infestations involves the use of toxic rodenticides presented in edible bait formulations. Alternative control methods are described in Section 6.

Such materials have to be approved under the Control of Pesticides Regulations 1986 and must be used according to the approval conditions and label instructions. The selection of products needs to take account of the toxicant involved and the type of bait presentation as well as the differences between rats and mice with regard to species susceptibility, behaviour and other relevant variations. It is also necessary to be aware of the potential danger of secondary poisoning in non-target species that may eat poisoned carcases.

**Rodenticide options**

The two main groups of rodenticide in widespread use for the control of mouse infestations are anti-coagulants and calciferol (calciferol is not used against rats). Other minor-use compounds are discussed at the end of this section.

**Anti-coagulants**

These compounds interfere with the metabolism of vitamin K which is involved with the production of blood clotting factors. If these are absent or below critical concentrations the blood fails to clot and haemorrhaging occurs. Most poultry diets will contain a vitamin

supplement that will include vitamin K. Anti-coagulant rodenticides will therefore be most effective when access to poultry food by rodents is minimised or prevented.

**First generation anti-coagulants**

**These include rodenticides based on:**
**Warfarin, Diphacinone, Chlorophacinone, Coumatetralyl.**

These are still effective against susceptible rat populations that are not genetically resistant to such compounds. In practice, this means that many rat infestations in this country can be dealt with using this range of rodenticides. However, because house mice are naturally less susceptible to them, their use against this species is not recommended.

**Second generation anti-coagulants**

**These consist of:**
**Difenacoum, Bromadiolone, Brodifacoum, Flocoumafen.**

All four compounds are more potent than the first generation group and are effective against some rats that are resistant to the first generation anti-coagulant. They are also all suitable for use against house mice except in situations in which physiological resistance is found.

Difenacoum and bromadiolone formulations may be used in both outdoor and indoor locations whilst brodifacoum and flocoumafen may only be employed indoors. This is a mandatory approval condition because of the perceived greater hazard that such compounds present to non-target wildlife species.

Currently, neither brodifacoum nor flocoumafen may be purchased or used by farmers (including poultry farmers) and in such situations only professional pest contractors or local authority operators may apply these rodenticides.

**Calciferol**

This compound has a different mode of action to the anti-coagulants and consists of vitamin D which mobilises the calcium within the body of the rodent and results in hypocalcaemia and kidney failure.

It is not recommended against rats but is effective for the control of house mice. The compound is less suitable for outdoor use because a damp environment results in chemical instability and unpalatability.

**Other compounds**

The only other compounds that are currently approved are zinc phosphide (which should be used after a period of pre-baiting) and alpha chloralose.

Both are compounds that can kill with a single feed. They can pose hazards to non-target species and there can be significant risks to other animals from the consumption of poisoned rodents. Because of these hazards and because anti-coagulant compounds are more suitable for the control of rodents on poultry holdings they are not recommended for general use.

Alpha chloralose relies on lowering the body temperature of the rodent and will not work effectively in most environments. Rodents that consume a sub lethal dose and subsequently recover will tend to avoid similar poisoned baits. However, where a quick reduction in mice

numbers is required such as during short turn-round periods its use may be appropriate. The best results are likely to be achieved where alternative foodstuffs have been removed and the temperature is well below 13/14 degrees centigrade. It is not recommended in situations in which one of the previously mentioned options will be more effective. It is not suitable for use against rats or in outdoor locations.

**5.2 Rodenticide formulation and presentation**

Whichever formulation or means of presentation is used, great care must be exercised where there is the possibility of feedstuffs, livestock and products becoming contaminated.

Edible baits are formulated in various commercially available preparations which include:

- **meal or cut cereals**
- **whole cereals**
- **pellets**
- **wax-bound cereal blocks**
- **lards and contact gels**

The risk of introducing salmonella or pest insects in cereal baits should be considered when auditing supplies.

Rodenticides are also presented in dusts, liquids (water based) and in a tube wick system.

Dusts rely on the rodent picking up the toxic material on its body and then ingesting small amounts during grooming activity. Accordingly, the formulations are more highly concentrated than bait equivalents and this makes them unsuitable for application where foodstuffs, livestock and products such as eggs could be exposed to such materials and possibly contaminated.

Liquid baits are likely to have practical limitations on poultry units and the hazards to non-target species are a major consideration. However, although they might possibly be used in circumstances where water was not available such as an empty building, this presentation is not recommended for general use.

The tube wick system is only suitable for controlling mice. It employs a plastic tube that contains a wick impregnated with a viscous formulation of brodifacoum which the mouse picks up on its body when passing through the tube. This is then ingested during grooming.

These devices can be fixed to beams, pipes or ledges and can be used to good effect as a long term, preventative control technique. They also have an application in areas where bait formulations are inappropriate.

Contact gels, which work in a similar way, are currently approved for use only by certain pest contractors and are not available on the general market.

The use of gassing is limited to the control of rats in outdoor burrows. It is very unlikely that these techniques will be used regularly in dealing with rodent problems on poultry units. Phosphine and hydrogen cyanide gases are extremely toxic and must not be used near to

buildings or in any other situation that might present a hazard. Such use also requires specific training and should only be undertaken by suitably instructed operators working in pairs.

A number of conditions will influence the choice of which formulation(s) to use and will include:

- **location (indoors or outdoors)**
- **non-target or other hazards**
- **adverse site conditions (including damp or dusty environments)**
- **palatability**
- **cost.**

Most rodenticides are now purchased as ready-to-use formulations. However, a number of concentrates or master-mixes are available which allow users to formulate their own baits.

Their availability is restricted under the Control of Substances Hazardous to Health Regulations and they are generally only supplied where their use can be justified on sound technical grounds. These can include the need to use fresh or different bait bases in response to palatability or bait acceptance problems and a wish to utilise a liquid bait presentation. Suppliers will require purchasers to show that they satisfy the requirements of COSHH including the availability of adequate storage and mixing facilities and suitable protective clothing. As with all pesticide use it will be necessary for such users to have made a COSHH assessment of the compounds that they intend to use.

No hard and fast rules can be given with regard to the choice of formulation and much will depend on the nature and circumstances of the problem. There will often be a number of options that will be equally suitable and effective.

### 5.3 Baiting techniques

Having carried out a survey of all areas of the site and buildings, and decided upon a suitable rodenticide, it will then be necessary to establish bait points at appropriate locations that will cover all areas of rodent activity. However, there may be restrictions on such widespread application including:

- **hazards to poultry or other non-target species**
- **risks of contaminating feed or sensitive areas**
- **adverse conditions (e.g. wet floor areas)**
- **where baits will be regularly disturbed or eliminated.**

Commercially available bait trays, boxes or containers may be used or bait boxes can be constructed from wood or other materials such as egg trays. Where safe to do so, bait can be laid directly behind structures, in holes or gaps within buildings and in droppings pit areas. However, as with all bait placement, it must be adequately protected from access by non-target species.

Within poultry units there are a number of key areas which are likely to require particular attention such as:

- **food and egg storage areas**
- **material and equipment stores**
- **droppings pits**
- **voids in walls, ceilings or at ground level**
- **accumulations of materials and vegetation around the perimeter of buildings**
- **adjacent hedgerows and ditches.**

It is important that litter does not become contaminated with rodenticides, especially those presented as blocks, so that non-target species are not exposed to the rodenticide if the litter is spread on farmland.

Guidance on the quantities of bait to be laid and the frequency of bait points will be specified on the product label but, as a rule, a larger number of small points are required for mice whilst for rats fewer points will be needed but they will contain more bait.

The mode of action demands that the rodent must feed daily on the bait for up to five days and so it is essential that bait points are regularly checked and topped up as necessary. If bait is allowed to run out or there are not sufficient bait points, then control is likely to be unsuccessful.

The increased toxicity of brodifacoum and flocoumafen means that they are capable of killing both rats and mice following only one feed on the bait. This will influence the baiting procedures but monitoring and topping up of points will still be necessary.

### 5.4 Treatment strategies

The aim in poultry units should be to prevent rodent infestations becoming established by linking a baiting programme to regular monitoring and preventative measures.

The control strategy will vary according to whether action is to be taken whilst the birds are occupying the building or if measures are to be aimed at the end of the cycle when de-population, cleaning and disinfection is carried out. A limitation will be the ability to bait areas in which birds are present.

With regard to droppings pits or areas beneath slats where droppings accumulate, it is recommended that bait points are established when the house is restocked. These should be protected from subsequent contamination by the use of bait boxes or baffles to deflect the waste materials. They need to be sited around wall or structure perimeters or at other locations where rodent movement or presence is likely, or has been detected. Ideally, they should be checked regularly but if this is not possible it may still be worthwhile establishing points in these areas but increasing the amount of bait used and providing additional protection to ensure that it remains palatable throughout the flock cycle. One approach would be to place the bait in a lightweight plastic bag which can then be put into a bait box or other protected area. If baiting is undertaken in the pit, it is important for the uneaten bait to be removed when the pit is emptied and for such materials to be disposed of safely.

If infestation is identified in areas occupied by the birds and requires treatment, specific measures will be necessary to protect poultry from the rodenticide baits. These will include the use of secure bait containers and constructing baffles or tunnels that will allow entry by rodents but deny access to poultry.

Control at depletion will depend on whether routine treatments need to be continued or there has been a build up of infestation that will necessitate a specific eradication exercise.

If continued routine measures are indicated, such efforts should be maintained during the cleaning and site preparation stages and consideration given to increasing the number of bait points in livestock areas and droppings pits prior to restocking.

Where rats have been a problem or are likely to be present, perimeter baiting should continue in order to reduce the chances of them moving as a result of the disturbance caused by the routine end of cycle work and subsequently becoming re-established.

When mouse or rat populations have built up, it will be necessary to carry out intensive baiting of the area to eliminate the infestation prior to restocking. This will have to be fitted in with cleaning operations and operators should be aware that baits may become unpalatable due to contamination with water, disinfectant, fumigants and other cleaning materials. Baits should be replenished as necessary and must be maintained during the period when the house is empty and clean, awaiting a new batch of birds.

Continued baiting can help control rats and mice coming from other areas. For mice, bait will usually be laid indoors at places where there is a high risk of infestation but for rats it may be appropriate to locate well protected bait stations in hedgerows, ditches or other habitat features outside the unit which rats are likely to encounter when investigating a new site. This technique should be used in the autumn, when such movement is most likely.

Wherever rodenticides are used, it is a requirement that any discovered rodent carcases are disposed of by burning or burying. Unused or discarded bait should be dealt with in a similar manner.

### 5.5 Other control techniques

The use of methods other than those based on rodenticides have limitations in the control of rodents in poultry units and are unlikely to form a significant part of an overall strategy.

On occasions when toxic compounds are not permitted or rodents cannot be persuaded to accept baits operators may consider adopting other approaches.

#### Traps

These may be cages or other live capture traps or traps that operate by a spring mechanism that aims to kill the rodents which are captured. It is usually necessary to use a large number of either type of trap but checking, resiting and setting are time consuming and labour intensive.

Sticky boards incorporating a substance usually described as rodent glue are sometimes used. These are placed on runs or other rodent movement areas and rely on the rat or mouse becoming entangled and unable to escape from the board. However, for humane reasons these are not recommended.

All traps should be checked at least once a day and any rodents caught alive must be killed humanely.

**Ultrasonics**

It is claimed that high frequency sound can be used to distract rodent populations and drive them away from problem areas. A number of such devices are commercially available. Although the principle may appear attractive and offer benefits its practical application has generally produced disappointing results.

**Cats**

Cats are not effective in controlling rodents. They may themselves be a means of spreading infections such as salmonella and their presence on a poultry holding is unacceptable.

## 6. Hygiene and proofing measures

**Hygiene**

Two main areas require special attention.

**a) Concentrate foodstuffs**

The attraction provided to rodents by the availability of such foodstuffs will be more significant where storage and handling arrangements are deficient and if spillages occur. Rodents will be attracted to the area and populations will increase.

**Associated risks within poultry units include:**

- **outdoor bulk hoppers and delivery pipes where spillages or leaks will attract rats moving into, or around, the unit**
- **indoor stores where open hoppers or spillages may attract rats and mice**
- **faults in conveyors and other sections of distribution systems which may encourage a build up of concentrate spillages**
- **the presence of an abundant supply of food for rodents.**

**b) Harbourage**

Within units and building structures the availability of a wide range of material will provide habitat for rodents, particularly mice.

**The following will encourage the presence of rodents:**

- **a build up of rubbish within units**
- **the long term storage of high risk materials such as wood shavings, straw bales and egg trays**
- **stores containing equipment and spare parts**

- **poultry droppings and litter.**

**Outdoors, rats will utilise:**

- **rubbish and other materials in the vicinity of units**
- **natural vegetation cover**
- **ditches, hedges and banks**
- **rubbish dumps and incinerator sites.**

**Proofing**

The aim is to keep rodents out of vulnerable poultry buildings. Efforts need to be realistic and practical and take into account the physical capabilities of rats and mice.

Buildings offering an attractive environment and a source of food are most vulnerable to rats during autumn and winter when they are likely to exploit weaknesses or faults in the structures or associated areas. Mice are less responsive to seasonal changes mainly because they live within the fabric of buildings. However, factors which have a drastic impact on their environment such as depopulation and cleaning will influence the movement and distribution of mouse infestations. Their small size means that they can be easily introduced into units via the delivery and movement of materials such as foodstuffs, wood shavings, droppings or any other bulk items that are capable of providing a temporary refuge. Effective proofing of buildings or other structures against mouse entry is often extremely difficult due to their ability to get through very small gaps.

**Outdoor considerations**

If resources allow, consideration should be given to building a low wall completely round the poultry house or unit. It should be sited sufficiently far from the house not to impede ventilation and to allow the mechanical cutting of vegetation. The wall should be topped with a T piece to prevent rodents entering the area and to prevent migration away from the house during times of clean out etc.

The main entry points are poorly fitting doors or other access routes into units as well as gaps left around conveyors, electrical cabling or other services. Drainage pipes, badly fitting or damaged covers and grilles can be exploited by rats.

Damage to the exterior of buildings such as cladding or block-work may cause further problems and weaknesses in building foundations may make them vulnerable to the burrowing activities of rodents.

**Within buildings**

Both rats and mice will be encouraged by the availability of access to a safe environment such as that provided by:

- **entry points into electrical control panels and cable conduits**
- **faults and gaps in hollow wall spaces, roofs and partitions**

- **damage or wear and tear to floors or other surfaces that create gaps or cracks.**

**Remedial action**

A routine of inspection and repair to identified faults or damage should be implemented and may conveniently be incorporated into the work schedule at the cleaning and maintenance phase of the cycle. In most situations it is important to control the rodent infestation before carrying out any proofing work. If this is not done it may result in problems in other sections of the unit. Although there may be some additional cost the improvements will benefit the rodent control and prevention programme.

Metal baffles around services such as pipework and kick plates on the lower edges of doors will prevent them being gnawed by rodents. Door access that is only required during the removal of droppings can be temporarily proofed by adding a concrete fillet to the vulnerable ground level sections.

Depending on the circumstances drainage pipes or gullies should be proofed by fitting grilles, flaps or crushed wire mesh or other suitable materials.

Unit staff and outside contractors should observe the existing disease security measures. They should be made aware of the need to avoid creating rodent access routes and harbourages when modifying existing structures and when making changes to the management of the unit they should consider the effect they may have on the rodent population within it.

If the creation of potential problem areas is unavoidable it may be appropriate to incorporate inspection hatches or flaps to allow checks to be made for rodent infestation activity and to allow rodenticide baits to be placed.

The combination of hygiene measures and proofing will make a valuable contribution to the long term prevention of rodent infestations and so enhance the control of salmonella.

## 7. Safety considerations

The risks to the health and safety of the unit staff, others, livestock and wildlife must be considered with regard to:

**a) problems created directly by rodent infestations**

**b) risks involved in the use of rodenticides and control techniques.**

**Infestation problems**

Where rodents are present then the following basic disease precaution measures should be adopted:

- **When working in infected areas or handling contaminated equipment suitable waterproof gloves should be worn.**

- **Cuts or grazes should be treated and covered with a waterproof dressing.**

- **Hands or exposed skin should be thoroughly washed prior to eating, drinking or smoking and before leaving the site.**

- **Staff or others working on the site should be made aware of the potential risks of zoonotic disease (including Leptospirosis or Weil's Disease and salmonella) and the need to inform their doctor if there is the suspicion that illness has been contracted at work. Staff may be issued with contact cards which provide basic information on zoonoses.**

- **Staff and others on site should be warned about the hazards posed by rodent damage to electrical wiring systems.**

**Rodenticide use and control measures**

Operators should be familiar with the rodenticides being used and aware of the potential hazards that they may pose. The requirements for protective clothing and safe working practices must be understood before treatments are carried out. Specific measures will be required if baits are mixed and formulated on site. A COSHH assessment must be made for each rodenticide.

Planning of control operations should include the action that needs to be taken in the event of accidental poisoning. It is vital that those treating such cases are informed immediately of the specific chemical involved and any relevant information on its mode of action.

Records should be kept of the rodenticides being used and their distribution within the unit.

The protection of non-target species including wildlife, farm stock and domestic pets will need to take account of:

- **where and how the bait points are to be located**

- **the use of bait boxes and containers**

- **the disposal of carcases and unwanted bait.**

Rodenticides and treatment equipment must be stored in a safe and secure location, away from other hazardous materials such as fuel and substances such as disinfectants which could taint bait formulations. The exclamation mark **'Hazard Warning'** sign should be displayed in a prominent position on poison stores.

All containers used for storing or carrying bait must be properly labelled with the appropriate rodenticide information. A record should be kept of the type and quantity of rodenticides being stored.

Label instructions and precautions must be read, understood and followed.

Further copies can be obtained from DEFRA Publications, Admail 6000, London SW1A 2XX
(Tel: 08459 556000)