Chartered Institute of Environmental Health

Pest minimisation

Best practice for the hospitality industry

April 2009

1.0 Introduction

Aim of document

The document provides guidelines for pest minimisation for hoteliers and managers of establishments within the hospitality industry. It covers the recognition, prevention and management of relevant pest infestations.

The document has been produced by the Chartered Institute of Environmental Health (CIEH) Olympic Working Group on pest management. It is not intended to be fully inclusive but provides the key principles of best practice. The annexes provide more detailed information on common pests found in accommodation.

Although the 2012 Olympic/Paralympic Games are the main driver for the formation of this guidance, the principles can be applied to all accommodation used within the hospitality sector. Further documents are planned to form a suite of advice and best practice to help achieve consistency in the management and control of pest infestations.

The annexes cover a few selected pests. Many other important ones, such as ants and storage insects, may also commonly occur in the hospitality industry, but are not covered here.

Public health risk and pest minimisation

The CIEH recognises the importance of protecting the public from the threats to public health associated with pests. Rodents and other pests can cause serious damage to buildings, destroying insulation, causing electrical fires and damage to other structural components of buildings. Energy loss from rodent-damaged buildings can also result in added annual costs for business.

Pests such as rodents, cockroaches and flies may be responsible for transmitting infection and disease and are certainly reservoirs for pathogens that can cause illness in humans. Bed bugs cause irritating and unsightly marks. Although not associated with spread of disease, infestations are distressing.

Pest infestations can spread quickly through accommodation, are difficult to eradicate and can be very costly in terms of treatment, potential closure of the business and damage to its reputation.

Adverse publicity and litigation can be even more costly in relation to reputation and future business.

Pest minimisation and pest proofing are important steps in reducing the risk to public health and to safeguarding high quality hospitality/accommodation services.

There is a need for managers of hotels and other hospitality accommodation to take into account the risks of pest infestation and to ensure that accommodation is pest- proofed so that they do not create conditions that encourage and support infestations.

This is vitally important for the run up to and during London Olympic Games 2012, where large numbers of visitors are expected to stay in London and surrounding areas as well as other key tourist centres across the country. The impact of negative press coverage, with or without public health incidents, would be damaging to the hospitality industry.

General expectations and responsibilities on hoteliers and hospitality workers

- Owners and managers of premises are expected to take an active role in pest minimisation and management issues in their accommodation and to obtain professional advice as necessary
- Owners and managers of accommodation are expected to employ qualified pest control professionals and to follow safe, effective and sustainable pest control methods
- Such expectations are part of the general responsibility and duty of care of premises management to provide a safe environment for employees, customers, contractors, and others, under the Health and Safety at Work etc Act 1974
- Regulation (EC) 852/2004 lays down general hygiene requirements for all food business operators and states that the layout, design and construction of food premises are to permit good food hygiene practices including protection against contamination and in particular pest control. Adequate procedures should also be in place to control pests

Sustainability and integrated pest management

Owners and managers of hospitality accommodation are expected to put into place an integrated pest management plan that can be implemented and audited as part of the business/premises management programme. The plan should be sensitive to the issues of sustainability without prejudicing public health.

The plan should also encourage the minimal use of pesticides, and pesticides should be used in a way that minimises exposure to people and the environment.

Sustainable pest management can be achieved through regular inspections, dealing with infestations quickly, and implementing proofing and hygiene improvements.

The routine and preventative use of broad-spectrum insecticides within accommodation is not recommended.

Your local environmental health service, within the local council, will be able to give you more information and advice.

2.0 Recognition of pest problems/infestations

Managers and staff working within the hotel /accommodation must keep alert to any signs of infestation. In addition they should:

- Regularly inspect the premises for signs of pests on a fortnightly or monthly basis, including mattresses and beds; store rooms; food stores; kitchens and waste retention areas
- Regularly inspect the premises also for any situation that may encourage or support pest infestations
- Keep records of the inspection, findings and any action taken to treat an infestation
- Remedy any situation found through inspection as soon as possible to minimise the impact and spread of the infestation
- Set up a pest control contract with a specialist service
- Respond promptly to all reports from guests or staff and potential pest problems

The pest control contractor should be notified immediately of any evidence or report of potential infestation.


Kellogg's
SPECIAL K
PORTION-PACKS
Biscuits
BRAKES
BRAKES

3.0 Treatments

Where infestations are identified appropriate treatments should be implemented as soon as possible.

Professional pest control input should always be used. If a new pest control contractor is required, approach companies that are a member of a recognised trade association.

If a pest infestation in a bedroom is identified by hotel staff or a guest, the room should be taken out of service and the pest control contractor contacted immediately.

As guests may have inadvertently transferred the infestation on clothes, shoes and luggage, they should be relocated to another room, ideally on the same floor/area, to prevent further spread of the infestation.

Both areas should be treated by the pest control contractor as the guest may have inadvertently transferred the infestation in clothes, shoes and luggage.

4.0 Use and storage of pesticides

Working practices

Most pest control work on site will be carried out by a professional pest control organisation, typically either from the local authority environmental health department or from a pest control company who are a member of a recognised trade body.

The pest control contractor should provide a programme of proposed monitoring and remedial work on site, together with safety information on any products that they intend to use. At each visit, they should provide a report on their findings and recommendations, as well as details of any treatments carried out. Paperwork from the pest control contractor should be kept in a safe yet accessible place in the site office.

Use of pesticides

Good pest control is based on creating conditions which prevent pests from infesting premises. However, this may not always be possible and in many cases pesticides will still be required to remedy particular pest problems.

Under the Control of Pesticides Regulations 1986 and 1987 (as amended) it is illegal to advertise, sell, supply, store or use a pesticide in the UK unless it has been approved by Ministers for that use.

Many of the pesticides used in the industry will be approved for "professional use only". In this context, professional use is defined as use by someone who has received appropriate information, instruction and training; is competent to carry out the duties they are called upon to perform; and is required to use the pesticide as part of their work.

This means that only a properly qualified pest control operator should be employed to carry out any work required.

All approved pesticides carry an HSE reference number on the label confirming that they have been approved under the Control of Pesticides Regulations 1986 or 1987 (as amended). Checks should be undertaken to ensure that only approved pesticides are being used, since the use of illegal pesticides may have health risks.

Storage of pesticides and Personal Protective Equipment (PPE)

There are health and safety guidelines for the storage of chemicals and other equipment (particularly PPE) used in pest management and these should always be followed.

Pesticides should not usually be stored on site. However, where this is unavoidable, they should always be stored in well-ventilated, secure areas where there is no risk of spillage contaminating water courses. Guidance is available from the local Health and Safety Executive office or from www.HSE.gov.uk/pubns/ais16.pdf

Post treatment

Research has shown that where rodents are controlled with second generation anticoagulant rodenticides, there is a danger that non-target species, such as Red Kites, may take the carcass as a food source and so risk secondary poisoning. Pest control contracts must allow for seeking and collecting rodent carcasses as part of the treatment. It is also important that unused bait is also collected at the end of the treatment and disposed of safely.

Annex 1 - Norway rat and house mouse

THE CHARACTERISTICS OF RODENTS

Species

In the UK rats, mice, voles and squirrels are true rodents. Rabbits and hares are closely related. Of the true rodents, the house mouse (*Mus domesticus*) is by far the most important economic and industrial pest, followed by the brown, common or Norway rat (*Rattus norvegicus*). The ship or black rat (Rattus rattus) is now rare in the UK.

Characteristics

All rodents have a pair of incisor teeth in their upper and lower jaws. Enamel is present only on the front edge providing a sharp tool for gnawing a wide range of materials. These teeth continue to grow throughout their life to make good the wear caused by gnawing.

Breeding

Under favourable conditions indoors, rats and mice are capable of breeding throughout the year. Their high reproductive ability results in rapid increases in rodent populations.

Senses

The senses of rats and mice are highly adapted to the environment they live in. Their eyesight records shape and movement, especially in dim light, but does not register fine detail. Smell, taste and hearing are well-developed but the major sense is that of touch, by whiskers (vibrissae) and the guard hairs on the body. This and the possession of kinaesthesis or "muscle memory" enable them to move with confidence in complete darkness in familiar areas. Indoor movement is usually confined to wall-floor junctions and between cover. Rats and mice tend not to move across open ground if this can be avoided.

IMPORTANT DISEASES CARRIED BY RODENTS

Food borne illness

Rats and mice can be infected with bacteria which can be passed to humans through contaminated food and cause a number of food borne illnesses.

Weil's disease

This serious and sometime fatal disease - also called Leptospirosis - is caused by spirochaetes *(Leptospira icterohaemorrhagiae)* spread in the urine of infected rats. It is the most serious rat-borne disease in the UK. In England up to 30 percent of brown rats may carry Leptospirosis. The spirochaetes enter the human body through open cuts and grazes and by the mouth, throat and eyes from unwashed hands and contaminated water.

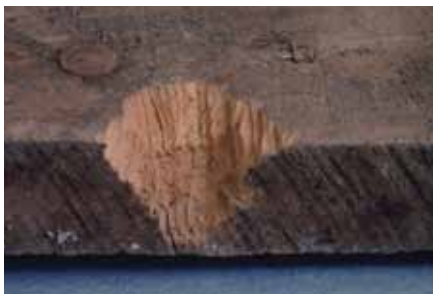
Toxoplasma

Toxoplasmosis is caused by the protozoan parasite *Toxoplasma gondii*. The definitive host of *T.gondii* is the domestic cat, but commensal rodents such as house mice and norway rats, non-commensal rodents, other mammals and some birds play important roles as intermediate hosts for this parasite.

T.gondii has been reported in house mice at a prevalence of 58.5 percent. Cats can become infected with Toxoplasma through consumption of infected intermediate hosts, especially rodents. People typically become infected through contact with infectious oocysts shed in cat faeces, an event that can occur while cleaning cat litter boxes.

Infections also occasionally arise from eating raw or undercooked meat, particularly mutton or pork, that contains infectious cysts. Pregnant women who become infected can pass *T. gondii* to their developing foetuses, an event that can lead to the death of the foetuses or other severe consequences.

Norway rat



The Norway rat is distinguished from the ship rat by its larger body size, blunter snout, smaller ears and short tail length relative to the body. Colour is not a useful distinguishing feature. As the ship rat is no longer common in the UK, only the Norway rat is described here.

Usually ground-living and burrowing, the Norway rat is able to climb and is the only species to occur in sewers in the UK.

Evidence of rats droppings

Norway rat droppings are up to 12mm long, spindle shaped and often found grouped in latrines. A rat may produce up to 40 droppings each day.

Smears

Smear marks will be produced where rats are running over surfaces, up walls or through holes.

Burrows and runs

Burrows may be found in banking, among shrubbery or ground cover plants and below buildings. Runs through grass between adjoining burrows can help to identify the source of a rat infestation.

Damage

Considerable damage can be caused to the fabric of a building or stored goods by the activities of rats. Much of the monetary loss will be due to contamination rather than the amount eaten.

Rodent damage to electrical or IT wiring, or to plumbing, may have severe repercussions.

Live rodents

Sightings of live rats during the daytime suggest there is a heavy infestation, they are short of food, or a harbourage has been disturbed.

Locating the infestation

In hotels rats are generally found around the external areas. Bin areas, compactor sites and areas of landscaping provide the necessary food and shelter. If rats are not controlled in these areas there is a risk that they may find a way into the building.

Methods of controlling rats

The use of baits outdoors must be carried out with care to avoid access to bait by non-target species of animal or bird, guests' pets and children. In order to reduce the risk of secondary poisoning through predators and scavengers accessing dead or dying rats, regular inspections are required to search for and dispose of bodies. This should be included as part of your pest control contract.

Proofing

External proofing is essential to prevent rats getting into buildings. Young rats are able to gain access through gaps as small as 10mm. Holes can be blocked with crushed chicken wire and cement, grilles can be fitted over air bricks, and door bases can be sealed with metal plates or bristle strips. Roller shutter doors should be proofed with bumper seals.

Control of rats involves a thorough survey of the entire site noting areas to which rats may be attracted due to available food or cover. When placing baits they should be protected from the elements and access by non-target animals, pets and children.

Baits

Bait boxes should be sited to avoid creating a trip hazard for staff and guests. If rodent bait boxes become damaged and the bait exposed, contact your pest contractor immediately.

Regular inspections are required to ensure sufficient bait remains for continuous feeding and to check for spilt or exposed bait and to remove any rodent bodies.

When the rat infestation has been controlled all baits should be removed and measures taken to reduce the attractiveness of the site to rats by removal of food and harbourage.

Non-toxic monitoring blocks may be used where permenent baits are required.
All waste food should be contained and removed frequently. Avoid having thick shrubs close to building perimeter and waste storage areas.

Contact rodenticides

These can be used to treat concealed harbourages and burrows if they are dry.

Traps

The use of traps against rats requires a greater degree of expertise than for mice, however they may be useful for survivors of a rodenticide treatment or where, for safety or environmental reasons, other methods are not permitted. .

House mouse

Mice are distinguished from rats by their smaller size. Adult mice may be distinguished from young rats by their larger ears, longer tail length relative to body and by the head and feet, which in the young rat are larger in proportion to its body.

The house mouse is widely distributed in all types of industrial, commercial and domestic premises and is also found outdoors.

EVIDENCE OF MICE

Droppings
Mouse droppings are small (5-7mm) and spindle shaped and randomly distributed. A mouse may produce up to 80 droppings each day.

Smears
Where mice are regularly running over a surface contact with the grease from the fur will leave a dark smear mark.

Holes
Freshly-gnawed wood is generally light in colour and there may be fragments of the gnawed material present. Dust and cobwebs over the entrance to a harbourage suggest that it is no longer used.

Damage
Paper and cardboard are often shredded by mice for nesting purposes. Damage to foodstuffs and stacked goods can be an indication of the extent and size of an infestation.

Live rodents
Sightings of live mice during the daytime suggests there is a heavy infestation, they are short of food, or or a harbourage has been disturbed.

Locating the infestation
In hotels mice may be found throughout. Favoured locations would be under refrigerators, in meter cupboards, under plinths and behind panelling in kitchens, bars, restaurants and storerooms. Of particular concern is the presence of mice in public areas and guest bedrooms.

METHODS OF CONTROLLING MICE

Proofing
External proofing is essential to prevent mice getting into buildings. Mice are able to gain access through gaps as small as 5mm. Holes can be blocked with crushed chicken wire and cement, grills can be fitted over air bricks, and door bases can be sealed with metal plates or bristle strips. Internal proofing will limit available harbourage for mice and generally make life difficult for them.

Baits
The most common method of mouse control involves the use of edible baits containing a toxic ingredient which kills them efficiently and humanely.

Contact rodenticides
These are used to treat harbourages and should be used wherever possible. Contact rodenticides are passed into the mouth during grooming.

Traps
Break-back traps and sticky boards are last resort methods and are occasionally necessary to eliminate survivors of previous treatments. They may also be necessary where, for safety or environmental reasons, other methods are not permitted. The use of sticky boards to control rodents is contentious because they are potentially inhumane. There are major restrictions on their use in the UK and should only be used by trained professionals.

Annex 2 - Bedbugs

Introduction

Bedbugs are crawling, blood-feeding insects. Since the late 1990s infestations have increased in the UK, and elsewhere in Europe, the USA and Australia.

Bedbugs may occur in any residential premises, for example private homes, hotels, hostels, student or staff accommodation, cruise ships, etc.

Impact of infestation

Bedbugs do not carry disease. The bites however are irritating, a few people may develop a more severe allergic reaction, and most guests will be distressed and aggrieved to find their room infested.

If not properly controlled, bedbugs may spread through the building. Eradication of established infestations can be very disruptive and costly.

Prevention of infestation

From time to time, guests may unintentionally bring bedbugs into accommodation. Nothing can reasonably be done to prevent this.

Nonetheless there are a number of measures that will reduce the chances of any introduced bedbugs becoming established:

- Infestations are less likely to become established on metal bed frames
- Mattress covers will reduce infestation of the mattress
- Valances provide ample bedbug harbourage, and should be avoided
- Tightly fitting skirting boards, electrical sockets, wallpaper etc. reduce harbourage
- Any gaps around pipe work where it passes through walls or floors between guest rooms should be carefully sealed to prevent bedbug dispersion
- Ensure that headboards, bedside cupboards, pictures etc can be easily removed for inspection and treatment
- Cleaning of guest rooms should include thorough vacuuming close to wall/floor junctions and under the bed and other furniture. Ensure the vacuum cleaner is emptied daily and the contents disposed outside the building. Do not store the vacuum cleaner near clean linen
- Dirty linen removed from rooms should be placed directly in a bag or trolley, not deposited on the corridor floor. Housekeeping trolleys should be inspected weekly. Dirty linen should be kept entirely separate from clean linen, both when collecting it from the rooms, and in storage. Linen must be washed at 60°C to kill bugs

Detection of infestation

Early detection is important to prevent serious biting and the spread of the infestation through the building.

Most guests do not report infestation, and should not be relied upon to detect problems. Guest rooms should be proactively inspected for infestation. A programme for inspection of the mattress, divan base, headboard and valance should be prepared and staff trained in the process. Each room should be inspected monthly and the findings recorded.

- Bedbugs may be found in crevices in the bed frame, under divans, on mattresses, on valances, behind the head board, in bedside cupboards, behind pictures, on curtains etc. They measure 1mm to 5mm long, with the colour ranging from pale to dark chestnut brown. Squashed bedbugs may also be seen near the bed
- Bedbugs leave characteristic faeces; black specks measuring <1mm across, on surfaces around bedbug harbourages
- Small blood spots may be seen on the linen, typically at the head of the bed

Responding to a guest complaint

If a guest reports insect bites on departure, do not re-let the room but have the pest control contractor inspect the area immediately.

If a guest reports a possible bedbug problem while in residence, offer to move them immediately to another room. If possible, move them to a room on the same floor to avoid further dispersing the infestation. Ensure that both areas are inspected for infestation by the pest control contractor.

Treatment and eradication

Infestations should always be dealt with urgently. DIY treatments by staff are very unlikely to eliminate bedbugs and may even disperse the infestation.

Professional pest control input should always be used. If a new pest control contractor is required, approach companies that are a member of a recognised trade organisation. Seek quotes and references from three different companies. Clarify how the prospective companies would deal with a reported infestation. They should:

- Inspect more than just the room with the complaint
- Re-inspect treated rooms to ensure that eradication has been achieved
- Most importantly, they should agree to re-treat in the case of treatment failure if live bed bugs re-appear in the treated areas within six months

Clarify what they expect you to do:

- They may require treated rooms to be off-line for a period of a week or more
- They may require you to dispose of infested items
- They will require you to prepare the rooms by removing items such as fixed head boards and hessian bed bases to allow access for treatment

Once the treatment has been carried out, ensure that:

- The rooms remain off-line until given the all-clear by the contractor
- Agreed follow-up inspections by the contractor are actually carried out and reported
- The treated rooms are also regularly inspected by hotel staff. If bedbugs have survived, it is important that they are found during the current treatment period

Bed Bug treatments need to be thorough and are time consuming. Any contractor who offers a quick solution should be treated with caution.

Annex 3 - Flies

Medical significance - flies and disease

Flies are found around decaying organic matter, faeces and infected or contaminated material in which they breed. Their bodies become coated with microscopic particles of this matter. This is then deposited onto food, food preparation surfaces, cooking utensils and crockery.

Among the most dangerous of the disease-causing organisms which have been found on flies are *E.coli*,and *Campylobacter spp*.

Key features of flies commonly found in hotels

Species	Size	Appearance	Breeding sites
Common housefly, *Musca domestica*	Adults are 6-8mm long. Wing span is 13-15mm	The thorax is grey with four longitudinal dark stripes. The fourth vein on the wing bends sharply forward, almost reaching the third vein. Flyspotting is produced when feeding and defecating.	Eggs are laid in moist, fermenting or putrefying material such as excrement, rotting vegetable matter; especially that with a high protein content. Waste bins are regularly used as breeding sites.
Blowflies, family *Calliphoridae*	Generally 9-13mm long with a wingspan of 18-20mm.	The adults are large robust flies, with a stout abdomen. The thorax is black/blue and dusky, and the abdomen is likewise coloured.	Eggs on fish, meat, decaying matter of animal origin. Dead rats, mice and pigeons are typical sources of blowfly infestation.
Fruit flies, *Drosophila sp*	Fruit fly adults are small yellowish/ brown flies	Darkly, transversely striped abdomen. The prominent compound eyes are generally red in colour, although darker variants occur.	In kitchens, restaurants etc. Alcohol and waste fruit and areas with hygiene or drainage problems, particularly bars.
Drain flies, family *Phoridae, Psychodidae, Sciaridae,*	Often described as 'small flies' or 'drain flies'. Obtain professional identification.	Often described as 'small flies' or 'drain flies'. Obtain professional identification.	Found in association with moist decaying organic matter. Often indicative of blocked or broken drainage systems.

Control

The first point of fly control is to confirm the species you are dealing with by obtaining an accurate professional identification. Correct identification and knowledge of biology and habits of the species will help locate the breeding sites that need to be targeted for effective control. These breeding sites could be located indoors or outdoors, so control needs to be tailored with this in mind. Successful integrated fly management should include the exclusion, restriction and destruction of flies.

Exclusion

If the flies are entering from outside, it is essential that doors and windows are kept shut or fitted with fly-screening products.

Restriction

This is a crucial component of effective fly control.

Waste should be bagged and tightly sealed prior to disposal. Bins and skips should have tight-fitting lids. Try to site waste bins away from doors to avoid attracting flies to the building. Skip compounds should be kept very clean and ideally be bunded to contain spillage. Ensure waste is collected regularly and that there are an adequate number of bins.

Drainage systems must be kept clean and well maintained to prevent fly infestations.

Destruction

Chemical – residual and non-residual insecticides are available for fly control, depending on circumstances. These can be applied to both breeding sites and alighting surfaces.

Non-chemical – This includes use of physical measures, such as electronic fly killers.

Annex 4 - Cockroaches

The species of cockroaches most likely to be encountered in hotels in this country are:

- German cockroach (*Blattella germanica*)
- Oriental or common cockroach (*Blatta orientalis*)

A number of other species of cockroach are sometimes introduced into the UK in imported goods: the American cockroach (*Periplaneta americana*) and the brown-banded cockroach (*Supella longipalpa*). Small infestations of these species can be found in areas with higher temperatures indicating that once introduced, survival is possible.

Feature	German cockroach	Oriental cockroach
Length	12-15mm	25-30mm
Colour	Brown with two dark stripes on thorax	Dark brown to black
Wings	As long as body or slightly over-lapping in both sexes	Undeveloped in female. Only cover half the length of the abdomen in male

Summary of the identifying features, biology and habits

Life history and habits

Cockroaches produce an egg-case (ootheca) in which many eggs develop until the nymphs are ready to hatch.

In favourable environments, cockroaches breed throughout the year. Under adverse conditions, (low temperatures or lack of food), the duration of development of egg and nymphal stages is extended.

German cockroaches tend to remain in groups after hatching and stay in the ideal environment initially selected by the female. Nymphs of the Oriental cockroach become more widely dispersed.

In hotels German cockroaches are usually found in kitchens, laundries, and food preparation areas with high temperatures and high humidity. This species has pads on its legs which enable it to run up smooth, polished surfaces with ease; it is often found above floor level. German cockroaches can also be found in guest bedrooms.

Because it lacks the sticky pads on its feet, the Oriental cockroach is often found at, or near, ground level, and is particularly common in basements and underground ducts. However, it is able to climb rough surfaces where it can grip with the claws on each foot and may be found at roof levels for example among bird fouling.

Cockroaches have flattened bodies which enable them to penetrate into cracks and crevices. They have a built-in timing mechanism which prompts them to emerge from their hiding places at the same time each night, irrespective of lighting conditions. Switching on a light may cause cockroaches to scurry for cover; lights left on all night will not deter them.

Diseases carried by cockroaches

At present there is no firm evidence to link cockroaches with an outbreak of disease. However, the cockroach will eat almost anything it can chew and often vomits portions of undigested material containing disease organisms. Since many disease-causing organisms can pass through the gut of the cockroach and remain infective, cockroaches must be considered potential carriers of diseases such as *Salmonella*.

Susceptible individuals may respond to exposure to allergens in cockroach cast skins and excrement, developing an allergic response.

Cockroach allergens have been associated with asthma symptoms in allergic individuals and so their presence will also be a concern for employees working in environments infested by cockroaches.

Inspection for cockroaches

Although cockroaches can be found almost anywhere at any time, the following locations are especially favoured and should always be thoroughly inspected:

Adhesive crawling insect detectors can be succesful in pinpointing the source of an infestation.

In kitchens, German cockroaches can be found behind and under ovens, sinks, and kitchen units, around water pipes and radiators, particularly where pipes pass through walls. Inside cupboards, under reward tables, remove drawers and inspect all surfaces, especially behind wall tiles.

Every small crevice provides potential harbourage; panelling, architraves, skirting, cavities and floor boards should all be inspected. In kitchens and catering areas they can be found inside three pin plugs and sockets. Infested goods can be delivered via the kitchen which may be connected to other parts of the building by ventilation and service ducts. Laundry baskets are often a means of transfer between premises.

Oriental cockroaches infest drier and cooler environments; cellars, pipe ducts, store rooms, boiler houses, and floor cavities are favoured locations. They are often associated with poor brickwork and cracks in concrete which provide many harbourages. In the summer this species may also breed outside in outbuildings, drains, and rough ground and rubbish tips.

In hotel bedrooms, German cockroaches favour areas of high humidity such as gaps around the bath or shower. If a refrigerator is present in the room the motor compartment and seal around the door are the likeliest areas to find live insects or evidence of their presence.

Efficient control of cockroaches depends upon detecting the full extent of the infestation; one small group of insects left untreated can be a continual source of re-infestation.

Visible signs

Large infestations of cockroaches may be hidden during the day but the marks left by cockroaches are evident on surfaces where they walk. These streaks are liquid excreta produced by cockroaches when water is readily available.

Egg cases (oothecae)

The empty egg cases of the German cockroach are often hidden in harbourages but may fall behind cupboards, cookers and other fittings. It is rare to find a full egg case since these are carried by the female until shortly before hatching. The egg cases of oriental cockroaches are sometimes carefully concealed, the female bringing debris from a distance to hide them. This species of cockroach deposits the egg case within 24 hours of formation.

The egg cases of the oriental cockroach will take approximately six weeks to hatch.

Cast nymphal skins

The shed skins are light, easily blown about and may be found anywhere but are usually near harbourages.

Live insects - using visual inspections

Live insects are usually not obvious during daytime inspections. At night, some cockroaches come out of harbourages in search of food and can be located by an inspection at this time.

Control of cockroaches

Harbourages should be treated using a suitable insecticidal spray or bait.

Large cavities and deep-seated harbourages should be treated using a dusting powder. Bait can be used where the use of sprays or dusts is inadvisable or forbidden, or in areas where dust may not be used because of fall-out or damage to electrical equipment.

Follow-up treatment (one week after initial treatment)

Carefully inspect for cockroaches. Treat any harbourages that were inaccessible or missed on the initial treatment using spray or dust.

Further treatments

Sticky pad insect detectors used to monitor the presence and extent of infestations are readily available.

A further comprehensive treatment should always be carried out a few months after the initial treatment to control nymphs of the oriental cockroach hatching from concealed oothecae.

Because residual allergens can remain active contaminants for some time after a treatment, a thorough cleaning regime should be carried out afterwards.

Annex 5 - Fleas

Background Information

Fleas are small insects, the adults being around 2 mm long, reddish brown in colour and flattened from side to side, a feature that enables them to move easily among the hair of their vertebrate host. The most distinctive features of fleas are the large jumping legs and the row of black non-sensory spines on the front margin of the head and on the rear of the first thoracic segment. These bristles or combs are a diagnostic features of fleas.

Adult fleas are external parasites and take their blood feeds from a host animal, which may include humans. Flea larvae on the other hand are not blood sucking and feed upon general organic debris. Fleas have the ability to remain dormant in buildings over a period of time.

Biology

Fleas are usually found close to the host animal or its harbourage. The hosts are animals such as cats, dogs, birds, hedgehogs and humans.

After mating, the female flea lays several hundred eggs in batches after each blood meal in the host animal's fur, bedding, resting site and in areas where the host is to be found. The eggs are small (0.5mm) white and oval in shape. From the egg emerges the larval stage, which is again white in colour, legless but covered in large bristles. When mature the flea larva is about 5mm long and it spins a cocoon of silk which very quickly gets covered in a large amount of dust and debris. The pupa develops within the silken cocoon and when triggered by suitable stimuli such as vibration, the adults emerge to feed upon the host animal. A typical flea infestation in a property is likely to consist of:

50 percent as eggs
35 percent as larvae
10 percent as pupae
5 percent as adult

Significance

There are numerous species of flea, the more common ones encountered being:

- Cat flea *Ctenocephalides felis*
- Dog flea *Ctenocephalides canis*
- Bird flea *Ceratophyllus gallinae*
- Human flea *Pulex irritans*

The cat flea is the species most often encountered. The human flea is found rarely on humans but can be found on wild animals such as hedgehogs and foxes.

Each species prefers its own host but can take a blood feed from other animals, including humans.

In the hospitality environment, fleas come predominantly from

- Feral Cats
- Guests

Guests introduce them on infested pets. Dog friendly hotels should be especially careful.

Flea bites can cause considerable distress to people and typically bites will be found on legs, particularly around the ankles. There may be a delay between the bite and the reaction and scratching of the bite may cause secondary infection.

The cat and dog flea can act as intermediate hosts for the cestode tapeworm, *Dipylidium caninum*, which normally develops in the digestive tract of dogs, cats and some wild carnivores, but also occurs in man and particularly young children. Human fleas are not thought to spread disease.

Control

- Accurate identification of the pest is important as this can help determine the source of the infestation
- Infested pet bedding should be washed in a 60°C detergent wash. Heavily infested bedding should be disposed of
- Thorough vacuuming of the infested and adjacent areas will help to remove the insects. The vacuum bag or the contents of a bagless vacuum must be emptied then promptly disposed
- Treatment, in accordance with label instructions, should be undertaken to the infested areas. Treatment should be directed to any areas where pets have frequented
- Pets may need to be treated but this can only be undertaken using an approved veterinary product. Such a treatment should not be carried out by the pest controller but by the owner of the animal or a vet

Note that there may be other reasons why people complain of "bites" and the most common of these is static discharge and this typically occurs in offices with nylon carpets. Other reasons include skin irritants such as fibreglass, paper particles, carpet fibres etc. In such cases where an insect culprit has not been found, the pest controller should not treat with insecticides but should look at other methods of alleviating the problem.

Flea adult

Flea larva

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