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Heaven scent

Getting great results from scent detection dogs



Set up in 2010 the Bed Bug Foundation (BBF) is a not-for-profit foundation, dedicated to raising awareness of bed bug management through improved communication and education. For the past two years, the Foundation has functioned as a trade association for the small but emerging bed bug scent detection industry in Europe.

Dr Richard Naylor, is one of the members of the BBF Senate, and also the newest member of the Pest Technical Advisory Board, so Frances McKim was delighted to interview him during her recent visit to Richard's facilities (see pages 22 & 23). The latest challenges faced by scent detection dogs were discussed including the recently reported topic of false alerts to carpet beetles. ▶▶▶



Firstly, Richard, what makes bed bug scent detection so challenging?

For the handler, it is as much an art as a science. The handler must understand how scent moves around in a room, the impact of disturbance, air conditioning, open windows etc. While many of our teams have backgrounds in other scent detection disciplines, such as drug and explosives, bed bugs present some unique challenges. The target odour is usually much smaller, which means that the dog must search a room very thoroughly. The handler has to guide the dog around the room, taking care that no potential hiding places are missed. It may be necessary to move a piece of furniture or bed away from the wall to give the dog access to all the hard to reach areas.

It is essential that the handler also has an intimate knowledge of their own dog's specific behaviour. Dogs are dogs, they are not machines. They get tired and have off-days just like people. Dogs can be crafty too. For the dog, finding bed bugs is a game, which results in a reward if they are successful. Some dogs will false-alert in order to get their toy or treat, but an experienced handler will usually recognise this behaviour when it arises.

In training, dogs can also learn to track the odour of the handler who places the hides, rather than search for the target directly. This means that the dog can appear to be performing very well during training exercises but may be much less reliable when on the job. Similarly, dogs become adept at reading the behaviour of their handlers.

Very often when dogs find something that they are not sure about, they look to their handler for affirmation. What the handler believes about the presence or absence of a target scent in that location can influence the outcome of the search, which has been demonstrated in a study by Lit *et al* (2011).

Does the BBF's Bed Bug Scent Detection Dog certification help to root out the cowboys from the industry?

Cowboys aren't the problem. Everybody in this industry is absolutely passionate about working with their dogs. They train with them daily, refining their searching skills, to make them into the ultimate bed bug

detection tools. But this is challenging work. Reading subtle changes in the behaviour of a dog that is constantly working in unfamiliar environments is really difficult and takes years to master.

One of the primary functions of the certification is to identify training issues that the handlers need to work on. Approximately 80% of teams that take our certification fail the first time. This is most often because the dog indicates on a distracter, such as dead bed bugs. But approximately 80% of those that retake their certification pass the second time around, so we can show a tangible benefit, in terms of quality of service, in the work we are doing.

The funny, and sometimes frustrating, thing about dog handlers is that they are often really critical of each other. Larry Hansen, the BBF trustee responsible for the canine side of what we do, says: "The only thing that two dog handlers will agree on is what the third handler is doing it wrong!" I find this often to be true. I guess it mostly stems from business rivalry and it probably occurs



Adult carpet beetle (*Anthrenus verbasci*)

in every industry, but it is a shame because it stops people from sharing ideas and highlighting issues, which allows bad practices to creep in. Nobody knows what they don't know and it is surprisingly easy for mistakes to go undetected.

The BBF has been holding regular training meetings to help address these issues, which has had the positive side-benefit of creating a community in an industry dominated by people who, apart from their dogs, work alone. The benefit of working within a community proved itself this year when carpet beetles were raised as an issue we needed to address.

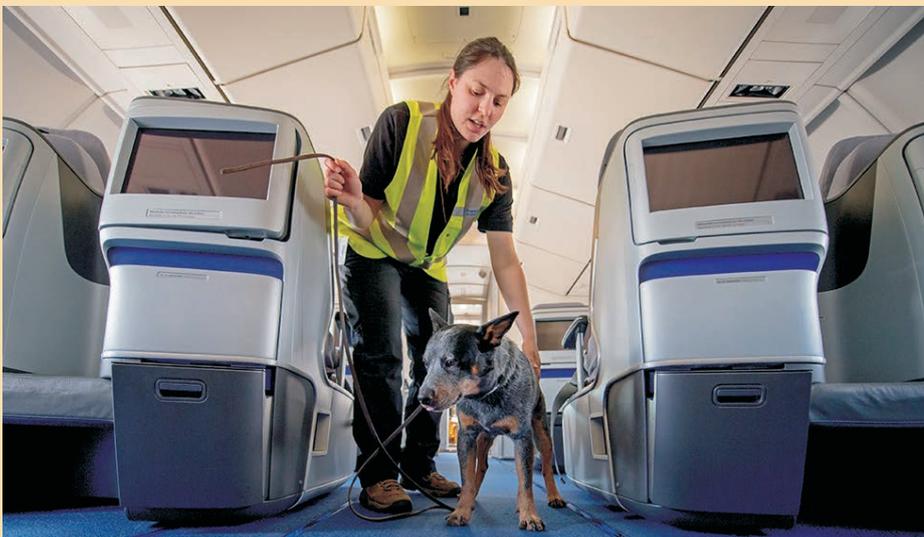
Carpet beetles? Please explain...

Earlier this year we had several reports from teams and associated industry professionals, that their dogs had hit on carpet beetles (*Anthrenus verbasci*). Some of these teams had passed the BBF certifications within the past 12 months and had proven themselves at finding bed bugs.

First of all, we wanted to know how widespread this problem was, so we sent vials of carpet beetles to our affiliated training schools and asked them to screen as many teams as possible. Almost half of the dogs we screened did indicate on carpet beetles, despite having only ever trained on bed bugs.

Oh no...does that mean bed bugs and carpet beetles smell the same?

No, we don't think so. Well, I'm sure that they are recognisably similar, in as much as they are both insects and therefore share many common constituents, such as a chitin cuticle and a host of fats and proteins that are common to the entire insect group. But insects use pheromones to find each other, and these chemical signals are usually fairly specific to the species, or at least to a



Dogs are not machines. Handlers must have an intimate knowledge of their dogs' behaviour



The BBF holds regular training meetings which has had the added benefit of helping create a community of handlers

group of closely related species. Carpet beetles primarily use (Z)-5 and (E)-5-undecenoic acid, while bed bugs use (E)-2-octanol and (E)-2-hexanol.

But just because the dog is able to tell the difference between a carpet beetle and a bed bug, this doesn't necessarily mean that it knows what to do when it finds one. Presented with something new and recognisably similar to the target scent it is searching for, many dogs will look to their handlers for guidance. The subtleties of what happens in the next few moments can have profound implications for the team's effectiveness from this point forward.

There is a mantra in the scent detection industry; 'Trust Your Dog', and this is why. It is essential that the handler maintains a poker face and lets the dog make up its own mind. The dog may decide to move on, in which case the handler should let it.

But, it is all too easy for the handler to influence the dog's decision. The dog looks at the handler...the handler looks back at the dog...their eyes widen in anticipation of the reward (usually a favourite toy or a tasty treat). If the dog alerts, it will receive its reward. There is never time to confirm the find before rewarding the dog, because this breaks the association between finding something and being rewarded, so the handler has to reward the dog if it makes a positive indication. But if the dog just alerted on something new, then in rewarding it, the handler has just taught the dog a new target scent. Next time it may not even look to its handler for help.

Does it really matter if a dog indicates on something else? Aren't alerts confirmed with a visual inspection anyway?

Ideally, yes, but in reality, this is not always possible. If the dog alerts on a piece of furniture with inaccessible voids and no obvious signs of infestation, then the handler must make a judgement call about whether or not to trust the dog. Some handlers will work alongside a pest controller, who may be able to dismantle the furniture and confirm indications retrospectively. Unless this happens, the handler may never realise that they just added carpet beetles to their repertoire.

Because bed bugs can be so elusive, situations where alerts cannot be verified are relatively common and this doesn't necessarily mean that the dog was wrong. In most cases if the dog alerts, some kind of treatment will be made, even without visual confirmation, "to be on the safe side". It is easy to see how this can result in unnecessary treatments.

So what can be done to fix this problem?

Interestingly, alerting on carpet beetles was much more common for teams that trained primarily on their own. Dogs that trained regularly at training schools generally showed no interest in carpet beetles. This is likely to be because in a school environment, the hides tend not to be placed by the handler, so the dog can't rely on the handler's scent and/or body language to help locate the target. BBF certified teams are now required to visit a training school every three months for a training session and to confirm that their dogs show no interest in carpet beetles.



Putting that amazing nose to work!

Training on bed bug pheromone extracts has also proven to be a helpful tool. Using a method modified from Pfeister *et al.* (2008), the bed bug cuticular pheromones can be extracted into a solvent and then evaporated onto strips of filter paper. This makes it possible to train the dog on the very specific component of the bed bug scent picture that distinguishes it from other species.

The presence/absence of cuticular pheromones also helps dogs to recognise the difference between live and dead bed bugs, which is an important skill when dogs are being used to confirm treatment success.

More about BBF

In December 2016 the BBF published its *European Code of Practice for the use of scent detection dogs* and has become the certifying body for the bed bug scent detection industry in Europe. Currently around 70 scent detection teams from four countries are engaged in an annual recertification process. Successful teams are listed on the BBF website so that pest control companies and members of the public, can find teams working in their area. See www.bedbugfoundation.org/bedbug-dogs/