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Home visiting

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The natural history of the honeybee

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UP FRONT...

We all know the old saying, 'what goes around, comes around', and those of us of more mature years have often seen this to be proved true. Such is the case with the 'comment' article in this issue of *Veterinary Practice Today*.

Nikki Gaut talks about 'that sinking feeling' a home visit request used to produce, and the effort we used to make to persuade clients to bring their pets into the surgery. However, she then goes on to show that home visits are now re-emerging – not only as a benefit to patient and client, but also as a means of making a practice stand out from the crowd.

As client expectations continue to increase and veterinary practices continue to search for more ways to impress and attract new custom, it's ironic that a service that we thought was improved greatly by being performed in the practice environment, rather than at home, has now taken a U-turn.

Just as clients have expectations of their veterinary practice, so do employees – be they voiced or unvoiced. The article by Deborah Croyle on the 'psychological contract' – the unwritten expectations, beliefs and perceptions that exist between an employer and their employees – makes interesting reading. Do employers *really* know what their employees expect from them; and what about the reverse? There may be an employment contract, but that is a very different thing from the unwritten and often unspoken expectations on both sides.

Ultimately so much of the success of practice/client and practice/employee relationships is down to good communication and Kristie Faulkner's article 'Communication in practice' helps us to understand better the ways to successfully communicate with others.

We often struggle to achieve good communication, and perhaps the experts in this complex skill are the bees that have amazing and complicated methods to communicate with each other in the hive. So it is a pleasure to publish in this issue the first of two articles on the intriguing world of the honeybee written by John Hill, president of the newly formed British Bee Veterinary Association (BBVA).

We humans may not be as organised as bee communities, yet good communication is vital if a practice is to function both efficiently and effectively, not just because everyone needs to be aware of what others are doing but also in terms of information sharing at clinical, practical and management level.

Veterinary Practice Today continues to provide innovative PPD articles covering all areas of veterinary practice. Our aim is to appeal to – and inform – all those involved in providing veterinary care and we welcome feedback and suggestions from our readers. So please communicate with us.

Maggie Shilcock
Editor

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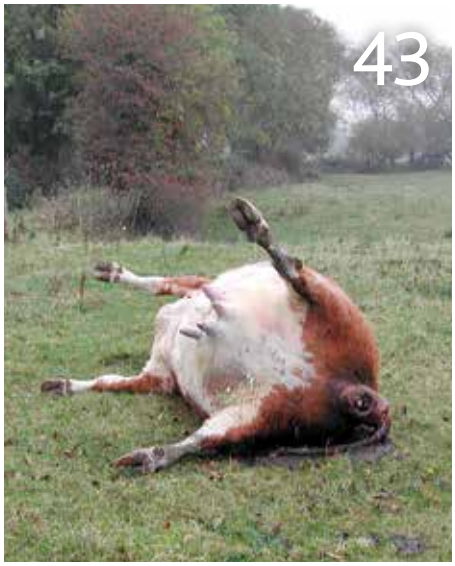

Exotics and wildlife

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Correction: The incorrect answer was given for PPD question number four in the article entitled 'Isolation and barrier nursing' on page 11 of *Veterinary Practice Today*, volume four, issue one, Jan/Feb 2016. The correct answer is given below:

PPD Question 4.
The correct method of cleaning a cage is:
A. sides, roof, floor, door
B. roof, sides, floor, door
C. floor, sides, roof, door
D. roof, door floor, sides
Answer is D

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Home visiting service for cats – could it work for your practice?

Nikki Gaut
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Nikki Gaut qualified from the RVC, London, in 2003; she is an RCVS Advanced Practitioner in Feline Medicine and gained membership in feline medicine with the Australian and New Zealand College of Veterinary Scientists (ANZCVS) in 2014, for which organisation she is now a mentor. Nikki works at a feline-only clinic in London, regularly goes abroad to teach on trap-neuter-release projects, writes monthly for Your Cat *magazine, as well as enjoying being an examiner for the ISFM Nursing Certificate and Diploma. She has recently joined the RCVS as a part-time Practice Standards Scheme assessor.*

In recent years there has been a trend amongst feline practitioners towards home visits, especially for palliative or end-of-life care. In this article, Nikki Gaut explores the benefits of the home visit to your feline patient, its owner and your practice, and how it might work for you.

The great escape

The telephone rings at reception. Little 'ginger-ninja', Sonny, has escaped again. Poor Mrs Briggs is covered in scratches, and the vet now has an unused vaccination appointment, a distressed owner and an upset cat who can't understand why his lazy afternoon nap in the sun was disturbed to be bundled into a box against his will. Next time he'll be ready, next time he'll know when he sees that box!

Figure 1. *We can only truly determine the 'normal' when we are able to adequately examine and observe pets in their 'normal' surroundings, free from fear and stress.*

For every Sonny, there's also the cat that gets so travel sick on the way into the vet that it arrives wearing most of what it has eaten. Or there is the cat that is so frightened that it attacks the vet as soon as a tentative hand of friendship is offered.

We've all been there. And what starts off as a few failed visits, often ends up with a lost client for the practice. Dear Mrs Briggs – who loves and wants to do right by her beloved pet – cannot face putting him through the trauma, upset – and sometimes – embarrassment of a routine check-up appointment again. This has implications not only for the cat's health and early recognition of disease, but also because many insurance companies will insist on regular check-ups in order to honour their policies.

Although this article focuses on our feline patients, many of the points raised here also apply to our canine patients, whose idea of going to the vet is anything but a walk in the park!

The uniquely fearful feline

In the wild, cats are free-roaming, solitary, territorial, hypervigilant hunters – and with pet cats retaining these inherent traits, they will feel anxious and fearful in unfamiliar environments. However, cats being well-known masters of disguise, these subtle signs can be difficult to detect and if the handler is not attuned to the signs of fear or stress then, without the ability to take flight, the cat will eventually feel it has to use its last resort – fight.

This distress leads physiologically to misleading or spurious results on physical examination, such as elevated blood pressure readings, heart rates and temperature readings (Little, 2011). There will also be blood tests demonstrating hyperglycaemia (Rand et al, 2002) and stress leukograms and the overriding ability to hide signs of pain – all parameters upon which we ultimately make our final clinical judgement and decisions. In a modern age, where preventive medicine is being driven forward, we can only truly determine the 'normal' when we are able to adequately examine and observe pets in their 'normal' surroundings, free from fear and stress (**Figure 1**).

With the advent of the International Society of Feline Medicine (ISFM)'s Cat Friendly Clinic (CFC) scheme, staff and clinics are beginning to see the positive effects of trying to make the 'visiting' part of the process easier and less stressful for our feline patients. Readily available sources of education now exist on the ISFM website (www.catfriendlyclinic.org) including, amongst other things, 'how best to transport your cat to the clinic'.

Those clinics that have signed up to the CFC scheme try to make the experience a more enjoyable one once the cat enters through the front door. This in turn leads to a happier, safer experience for cat, owner and the staff involved and helps to secure the bond between owner and practice, ensuring that they return time and again to their clinic because it "understands their cat" (**Figure 2**).

These cat friendly measures are vital for all small animal clinics to create an ethos of the right 'cattitude' amongst the staff throughout the journey from reception to vet. But what about those bonded clients again?

The answer for your owners, patients and practice may lie in a home-visiting service.

Home is where the heart is

Now, as a 12-year qualified vet, I remember the sinking feeling that used to occupy the pit of my stomach when I was asked to go on a home visit as a new graduate. Being asked to leave the safety and warmth of the clinic was, quite honestly, terrifying. I knew that in the clinic I had ready access to experienced colleagues who had been doing this for far longer than me, and the wealth of pharmaceutical agents at my disposal should Sonny decide that my gentle handling wasn't enough for him.

Many of us will have uttered the same time-old mantra of, "No Mrs Briggs, it is far safer for Sonny to be seen at the clinic where we have everything we need in a controlled environment" and "If he really is that sick, he should be seen in the hospital". However, in the majority of cases this is just an excuse. Ultimately welfare and safety have to come first; and, of course, there are some cats that, as soon as handling is attempted, will demonstrate fear and anxiety in the home as well, and for which only the clinic environment will do.

I have been in the fortunate position of working in London's only 'feline-only' veterinary clinic on and off for the past six years and can see the benefits of a feline-only environment on a daily basis. Yet being a cat-only clinic is not enough to calm these patients if the attitude of the staff handling them does not take into account the unique behaviours of the cat. The perfect cat-friendly clinic, therefore, adopts a multifactorial approach and one element cannot work without the other.

Fortunate as I am to work in a cat-only clinic, alongside caring staff who are masters in cat behaviour, I have still felt the need to introduce a home-visiting service once a week for my patients. Being a city-based clinic, we have many reasons for seeing this as a great idea.

Convenience

Many clients appreciate that they don't have to sit in busy traffic and find somewhere to park, with two small children and a highly-stressed cat, in order to attend the clinic. We do the travelling for them, whilst they can wait at home with a cuppa and leave the roadworks to us. My elderly or disabled clients, sometimes with multiple cats, no longer have to wrestle with heavy cat baskets on the bus and I can take any food or medicines with me so they don't have to make a separate visit to us.

Going that extra mile...

In a time in our profession when competition between clinics is fierce and owners appreciate a personal touch, it is important to be able to offer services that apply to the modern-day, busy, convenience-based lifestyle we now all wish to lead. With a huge amount of information at their disposal in the form of practice websites and social media, owners can get a feel for a practice long before they set foot in it.

And don't think this doesn't apply to rural practice too – for the year that I practised in Devon, I did more home visits than I'd ever done in my career, because homes were often further afield, more remote and journeys to the vet could be a two-hour round trip!

Setting up

For many practices, a van or ambulance parked on their driveway is often under-utilised and so the overheads for setting up a home visit service are minimal. Tweaking staff rotas to allow a vet and a nurse a day – or part-day – to complete home visits often does not require extra staffing, and the advantages of a using a branded vehicle to reach areas outside your usual catchment area can target a new – and often – very loyal client base.

Figure 2. *With the advent of the International Society of Feline Medicine (ISFM)'s Cat Friendly Clinic (CFC) scheme, staff and clinics are beginning to see the positive effects in practice. (Photo: Richard Murgatroyd Photography)*

The key is motivating your staff to understand why a home-visiting service works and what can be done once there. Independent mobile vets are now popping up everywhere and are making a reasonable living from this novel approach to providing veterinary care.

Advantages of home visiting

In my experience, anything that can be done in a consultation room can be done on a home visit, often without the time constraints imposed by a busy waiting room. The clients themselves invariably feel less rushed and more comfortable in their own environment, so history-taking can be more thorough and the pet will often settle better.

Being able to observe a patient in its own surroundings and discuss its behaviour is an advantage in cases of stress-related LUTD, over-grooming and inter-cat aggression related injuries. We all accept that behaviourists wish to do home visits as part of their assessment, so why should this not routinely be part of ours?

As we have moved further and further away from the James Herriot style of home visiting our patients, so we have lost a vital insight into our patients' lives and some of that familiarity that only comes with sitting and having a cup of tea and a chat with an owner on their sofa. My clients love the continuity that they will only see me and my nurse; but also understand that, if there is anything I can't do at home, I am more than happy to help them settle their cat into a carrier and take them with me to the clinic to perform my investigations.

And when it comes to end-of-life decisions, these days I would rarely do anything other than a home visit. The comfort and calm of a familiar home environment provides the privacy and dignity that a clinic simply cannot. This is a time when continuity of seeing the same vet, feeling unrushed and the cat being as settled as possible is paramount – and a home visit ticks all of those boxes (**Figure 3**).

No place like home

In summary, home visits could be the answer for your clients, your patients and your practice. They offer less stress for everyone and provide that all-important personal touch.

So next time Mrs Briggs rings up in a fluster and another appointment is cancelled, why not consider a home visit? Mrs Briggs will, hopefully, feel grateful that you've come up with an alternative solution and as a valued client will feel Sonny's care is of the utmost importance to you.

Sonny, however, will probably be understandably peeved at the prospect of the vet sitting in his front room. But then, you never know with our inscrutable feline patients...you may just win him over! ■

Figure 3. *When continuity of seeing the same vet, feeling unrushed and the cat being as settled as possible is paramount, a home visit ticks all of those boxes. (Photo: Richard Murgatroyd Photography)*

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www.icatcare.org/catfriendlyclinic

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*Suggested Personal & Professional Development (PPD)

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RABBIT WELFARE

Rabbits in practice – our welfare responsibilities

Three per cent of the UK human population own a rabbit – an estimated population of one million rabbits (PDSA, 2013) – many of which are still kept in less-than-ideal conditions. As veterinary professionals, we should be promoting the best care possible for these animals, as well as encouraging owners to visit regularly for vaccinations, health checks and advice on their well-being at home.

Rabbits still seem to be perceived as children's 'starter' pets. A survey of rabbit rescues in 2010 – looking at the reasons rabbits were given up to rescue centres – showed a shocking 34 per cent were there because a child had lost interest (MMC, 2010). Fifty-nine per cent of rabbits being given up to animal rescue organisations are surrendered within the first year of ownership (MMC, 2010).

These are complex animals with complicated needs; so figures this high suggest this critical information is not getting through to owners at the point of sale. This is reflected in the fact that one in five British vets is concerned about rabbits kept as pets (BVA, 2014).

Veterinary professionals have an obligation to make sure that owners are aware that they have a duty of care to their pet, and to ensure they take reasonable steps in all the circumstances to meet the welfare needs of their animals to the extent required by good practice (AWA, 2006).

This includes as a minimum to provide:

- a suitable environment
- a suitable diet
- the ability to exhibit normal behaviour patterns
- housing with – or apart from – other animals
- protection from pain, suffering, injury and disease.

We must ensure that owners are aware precisely what this means and in order to achieve this we must be aware of current recommended guidelines ourselves.

Suitable environment

Rabbit hutches are available online and in most pet shops throughout the UK. However, it is increasingly recognised that they do not provide the appropriate space or mental stimulation for the rabbits they house.

Minimum guidelines for housing the individual rabbit are to provide a 6ft x 2ft x 2ft hutch, together with a permanently attached 8ft x 4ft run (RWAF, 2014). Any rabbit should be able to:

- stand on its hind feet and its ears not touch the roof
- stretch out fully to lie down
- make three full-length hops in its enclosure (PDSA, 2013).

Very few hutches and cages currently marketed meet these basic criteria; and, anyway, it is now accepted that rabbits should live with bonded partners and *not be housed on their own.*

Many more rabbits are now being kept as 'house' rabbits. The same guidelines apply for these individuals (**Figure 1**), yet most indoor hutches and cages are even smaller to fit into the average family home.

In a recent survey, 18 per cent of rabbits have no opportunity for exercise on a daily basis – this was recorded as four per cent in 2011 (PDSA, 2013). This is unlikely to be simple, deliberate cruelty, but rather a lack of understanding by the owners of the needs of their pets.

The importance of enrichment cannot be underestimated (**Figure 2**). Rabbits are intelligent animals and should be given plenty of toys to

Figure 1. *Purpose-built indoor accommodation for house rabbits. (Photo: Kelly Anderson)*

Figure 2. *The importance of enrichment cannot be underestimated. (Photo: Charlotte Stubbs)*

Figure 3. *Branches from safe plants can be used to provide chewable toys.*

allow them to mimic natural behaviours such as digging, chewing and jumping. These do not always have to expensive – a good cardboard box can provide hours of fun and hay-stuffed toilet rolls are a staple classic.

Branches from safe plants can be used to provide chewable toys – dried apple branches are ideal for this (**Figure 3**). Many wooden and plastic toys can also be purchased with bells – all of which can help to provide a more stimulating environment.

Suitable diet

The ideal diet for any rabbit closely mimics the wild grass-based diet, with ad lib grass or good quality hay making up 80 per cent of the intake, supplemented with rabbit 'foods' and green leafy vegetables (Meredith, 2014).

There has, in recent years, been a decrease in the amount of rabbit muesli-type mix fed (34% from 44% in 2011) and an increase in pellet feed consumed (68% from 55% in 2011) (PDSA, 2013). It is important these feeds are of good quality and only given in small amounts – something not often discussed in practice.

Many rabbits, on examination, are overweight and this can be the consequence of many factors including overfeeding of pelleted or muesli diets, lack of appropriate exercise, overfeeding of unnecessary vegetables – carrots, for example – and overfeeding fruits and high sugar treats.

These should always be discussed with the client as 41 per cent of rabbit owners still feel there is not enough information available to help them understand their rabbit's dietary requirements (PDSA, 2013). We are perfectly placed to do this at vaccination appointments and through the provision of rabbit clinics run by the nursing team.

Expression of normal behaviour

Understanding the behaviour of their rabbits can be difficult for owners. It is important at all times to remind them that rabbits are prey animals, they are often fearful of rapid movement or predatory species and need places in which to hide and feel secure.

Vocalisations such as screams are fairly obvious; but the meanings of various grunts and snorts can often be confused as simply aggression when it can often be more closely linked to kennel guarding and inappropriate housing. Making owners aware of the meanings behind bruxism (teeth grinding) as a symptom of pain or discomfort is key in ensuring veterinary care is sought for rabbits when it is needed.

Understanding the body language of rabbits can be complicated; yet it can give us a good idea of how happy an animal is with its environment. Sitting hunched may be a sign of pain, and lying outstretched often means they are comfortable, relaxed and settled, feeling safe in their environment.

'Mounting' is often seen by owners as being sexual in nature, but can also be linked to dominance and ensuring all rabbits know their place in the hierarchy. Stomping of feet is a sign of anger or fear.

One of the most enjoyable – yet for someone seeing it for the first time, concerning – behaviours is that of the rabbit running in tight circles at high speed, flipping and twisting through the air, sometimes flicking its head rapidly. This is a sign of playfulness – known by rabbit owners as a 'binky' – which can be a good indicator of rabbit happiness. If the owner has never seen this behaviour, questions should be asked as to what can be improved.

Rabbits should be allowed space to run, gnaw and dig – all of which activities should be provided safely by their environment, indeed expected to occur, even within a house.

Social life and bonding

Rabbits are very social animals and when kept alone show signs of boredom, frustration and fear (AWF, 2012); which is concerning because almost two thirds (65%) of rabbits live alone (PDSA, 2013). The RSPCA recommends that rabbits should be kept with *at least* one other friendly, neutered rabbit (RSPCA, 2014) and this should be the standard recommendation given by any veterinary professional whenever any rabbit is being kept alone (**Figure 4**).

While keeping rabbits together is recommended, it is important that their bonding is undertaken slowly and in a controlled manner. Rabbits thrown together will often fight and cause each other undue stress and

injury. So introducing them in a small, neutral space – strictly supervised with no resources to fight over – is the ideal start.

Some rabbits will bond immediately; whereas others can take days or weeks to become settled in each other's company. Bonds can break down too, leading to fights and injuries; so behaviour should be closely monitored by the owner.

Contrary to popular belief, rabbits should not be housed with guinea pigs owing to their anatomical (smaller size and fragile back), behavioural, health (*Pasteurella* transmission) and dietary differences (Bays et al, 2006).

Often overlooked in veterinary practice is the importance of maintaining bonds when a rabbit is brought to the practice or hospitalised for any reason. Where possible, rabbits should be kept in their bonded groups for any visit and hospitalised along with a companion – advice which should be given when owners call to book their rabbit an appointment. This will reduce the stress of being in the practice, will make the rabbit more likely to show normal behaviours (such as eating and grooming while hospitalised) and reduce the risk of any bonds breaking down at home causing huge amounts of stress to the rabbits and owners.

Figure 4. *Rabbits are very social animals the RSPCA recommends that they should be kept with at least one other friendly, neutered rabbit. (Photo: Charlotte Stubbs)*

Optimising health

There has been a significant improvement in the number of rabbits being neutered and having initial vaccinations (PDSA, 2013). This is very positive for opening opportunities within the practice to discuss other aspects of rabbit care or, if time is limited, referral to nurse clinics.

In a recent Facebook survey by Supreme Petfoods, alongside Companion Consultancy, it was found that 82 per cent of respondents would use a regular dental check service, 71 per cent would use geriatric rabbit checks and 50 per cent would use a rabbit healthcare education service if it was offered (Supreme, 2014).

An interest in rabbits shown by the practice staff was the most important factor in choosing a veterinary practice with 99 per cent of respondents saying this was 'very important' or 'important' (Supreme, 2014).

While this survey was skewed towards an already caring and interested section of the rabbit owning community, it does show that there is a market for rabbit clinics which, once set up and running, are likely to open up opportunities to reach out to those rabbit owners who need that bit more support and guidance.

In our role as veterinary professionals, we are in a privileged position to be able to support and promote rabbit care as well as ensuring as many of these animals as possible are kept in conditions to allow them long, happy and healthy lives. ■

PPD Questions

1. What is the recommended minimum living space for an individual rabbit?
2. What natural behaviours should be mimicked by any toys provided?
3. How much of the daily diet of a rabbit should be made up of hay or grass?
4. What name is given to the behaviour shown by happy rabbits when they jump, twist and flip in the air?
5. What advice should be given to an owner with regard to bonded rabbits if one of those rabbits needs to visit or be hospitalised at the practice?

Answers

1. A 6ft x 2ft x 2ft hutch and a permanently attached 8ft x 4ft run
2. Chewing, digging and jumping
3. 80%
4. Binky
5. They should be brought in together and hospitalised together where possible to avoid the bonds breaking down

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ZOONOSES

Echinococcus multilocularis – epidemiology and implications for pet travel

Echinococcus multilocularis **is a zoonotic parasite that causes severe disease in affected people. There is local and metastatic spread of cysts leading to hepatopathy and potential multiple organ involvement. Despite significant advances in treatment over the past two decades, infected individuals can still expect a significant reduction in life expectancy. The adult tapeworm is carried by both foxes and domestic canids but is currently not endemic in the UK.**

The increase in pet travel across UK borders since the introduction of the Pet Travel Scheme, the relaxation in the time period allowed between tapeworm treatment and return to the UK, and the spread of the parasite across Europe potentially threatens this status.

Echinococcus multilocularis is a zoonotic parasite that is carried by both foxes and domestic canids. It causes severe disease in affected people but is currently not endemic in the UK. However, an increase in pet travel across UK borders since the introduction of the Pet Travel Scheme (PETS) potentially threatens this status.

The rules for travel under PETS were relaxed in January 2012 with the dropping of compulsory tick treatment before return to the UK and some relaxation of the rules regarding protection against rabies. These changes were made based on risk assessment.

E.multilocularis, however, is spreading throughout Europe. The need for compulsory tapeworm treatment for *E.multilocularis* before pets return to the UK has remained in place but the timespan in which this treatment has been given has increased, allowing some opportunity for infection to occur.

This article provides a review and update on the epidemiology, diagnosis, treatment and prevention of *E.multilocularis* infection as well as considering the risk of introduction of the parasite into the UK.

Life cycle and epidemiology

The life cycle of *E.multilocularis* is shown in **Figure 1**.

Eggs shed in the faeces of canids are ingested by rodent intermediate hosts (most commonly microtine voles) and the parasite then develops primarily in the liver, forming a hydatid cyst. As with *E.granulosus*, these cysts have an inner germinal epithelium from which brood capsules containing infective scolices bud off. When these are ingested by canids feeding on prey animals, the scolices mature to adult tapeworms in the intestine.

The adult tapeworms have a classic taeniid head with a scolex (**Figure 2**) but are only are 6-8mm long with four to five segments (**Figure 3**).

Unlike *E.granulosus*, the cyst formed in the intermediate host is multilocular (also known as alveolar) containing many sub-compartments. This leads to greatly increased pathogenesis in the intermediate host because growth of the cyst is both

Figure 1. *Life cycle of E.multilocularis.*

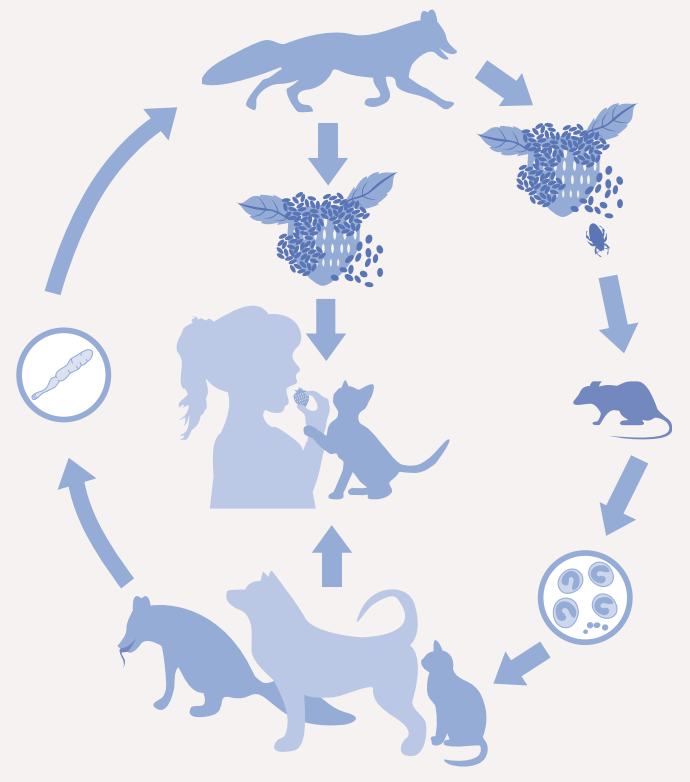


Figure 2. *Head of Echinococcus multilocularis. (Photo: Professor H Mehlhorn)*

Figure 3. *Adult Echinococcus tapeworm. (Photo: Bayer)*

locally invasive and also capable of distant metastases as compartments break away from the main cyst. Eggs are immediately infective once passed and human infection occurs through ingestion of these eggs, either directly from faeces or through contamination of the environment.

E.multilocularis is maintained in endemic areas by a sylvatic life cycle – with wolves, foxes and coyotes providing the main reservoir of infection in the definitive host and small rodents acting as intermediate hosts. Traditionally, zoonotic cases occurred among fox hunters, trappers and people travelling with them who had come into contact directly with faeces or with carcasses contaminated with faecal material.

In the 1980s, human alveolar echinococcosis was vanishing from Europe owing to improved food hygiene, decreased occupational risk of exposure and a decreasing fox population. This situation in Europe, however, was reversed in the 1990s, largely as a consequence of the following two factors.

1. Urbanisation of the red fox and increase in fox numbers

Red foxes have lived in urban areas of Britain since the 1930s and have been steadily increasing in numbers over subsequent decades. This was not the case in continental Europe until much more recently. In the 1970s and 80s, continental fox populations crashed following a rabies epidemic; although populations recovered in the 1990s owing to successful rabies control using an oral vaccine in foxes and rapid urban invasion has subsequently occurred. This has brought *E.multilocularis* into urban settings with increased numbers of zoonotic cases in continental Europe (Deplazes et al, 2003).

2. Potential for increased immune suppression in the human population

It is also hypothesised that increased immune suppression through increasing use of radiotherapy, corticosteroids, together with an increased prevalence of HIV, may also be playing a role in susceptibility to *E.multilocularis* infection in the human population.

As a result, in the year 2000, 559 cases were recorded in Europe; and during the 2000s there was a doubling of disease incidence in France, Germany, Austria and Switzerland and a dramatic increase in the Baltic States. This correlated with a time lag to increasing fox numbers in these countries. By 2010, *E.multilocularis* was widespread throughout Europe but the north of France, most of Scandinavia and Spain remained free of endemic infection (**Figure 4**).

Since then the parasite has become established in the Jutland peninsula of Denmark, Norway and the north western coast of France (**Figure 5**). Despite this rapid spread, the UK, Ireland, Malta, Finland and Iceland remain free of endemic *E.multilocularis* infection.

A similar picture has also occurred in North America where restriction of infection to the Artic fox and wolf had prevented *E.multilocularis* spreading from Canada and Alaska. However, just as infection spread from timber wolves to the red fox in Europe, infection in the USA has now spread to the red fox and coyote, allowing spread southwards. A case was recorded in 2013 as far south as Los Angeles. It has been suggested that this apparent increase in cases in the Western Hemisphere is the result of increased surveillance and reporting; but awareness of the disease and diagnostic imaging to detect its presence in people has been at a high level since the 1970s.

Figure 4. *Range of Echinococcus multilocularis in foxes in Europe in 2010. (Map: ESCCAP)*

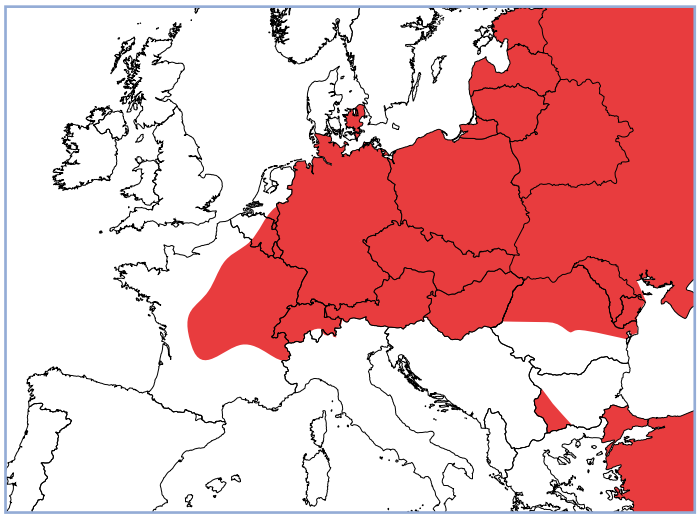
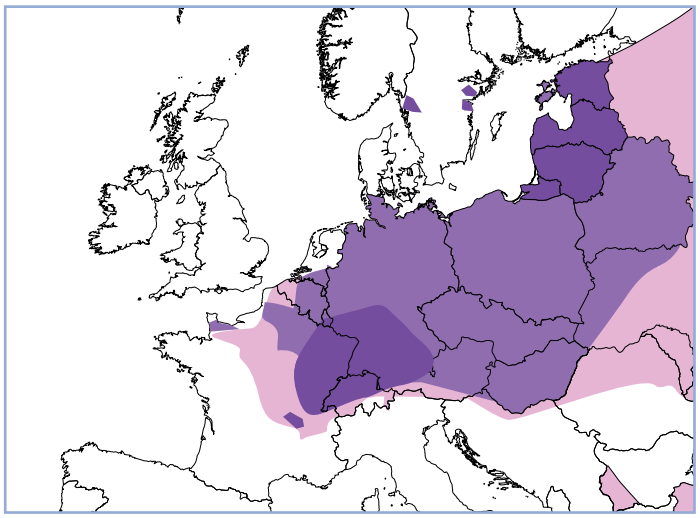


Figure 5. *Range of Echinococcus multilocularis in foxes in Europe 2014. (Map: ESCCAP)*



Cystic echinococcosis is often fatal and so even if left undetected would still have been detected at post-mortem. Therefore, the spread of the parasite and subsequent disease through Europe and North America can be considered to be genuine.

Diagnosis

The gold standard for diagnosis in canids remains examination of the intestines at necropsy by sieving intestinal contents, scraping the intestinal wall and then examination for the adult parasites (Deplazes and Eckert, 1996). This method is sensitive and specific in experienced hands; but is expensive, requires extensive safety precautions and cannot be used as a screening technique for live dogs. It remains useful, however, in establishing if a part or whole of a country is free of infection, such as in the UK (Smith et al, 2003).

Diagnosis in the live pet is problematic because adverse clinical signs are rare and proglottid segments are rarely seen in the faeces. Ova detection in faeces by faecal flotation is also a relatively insensitive method of detection (Wolfe et al, 2001) and if seen, the eggs are typically taeniid in appearance so they do not confirm *E.multilocularis* diagnosis.

Coproantigen ELISA and PCR tests have been developed to try and provide more sensitive faecal diagnostic techniques. Deplazes and Eckart (1996) found ELISA testing to be 80 per cent sensitive but this reached 93 per cent in foxes with worm burdens over 55 in number. Specificity was 95 to 99 per cent.

PCR testing of faeces has proved very promising with a sensitivity of 94 per cent and specificity of 100 per cent being reported (Dinkel et al, 2011). These tests provide hope for screening in the future, but are currently too expensive to be commercially viable. As a consequence, appropriate anthelmintic prophylaxis remains the safest option if there is the risk of potential exposure to the parasite, such as when travelling in endemic countries.

Pathology and treatment in the human patient

Not all people exposed to *E.multilocularis* will develop an established infection and the parasite may be eliminated by humans before the development of clinical signs. This can occur initially owing to an adverse intestinal environment and then following acquired immunity one to two weeks later. If infection does become established, then in immune-competent individuals, disease may take up to 15 years to manifest. Immunocompromised individuals, however, are highly susceptible to disease and develop clinical signs much more quickly.

In human infections, the spread of the cysts is similar to malignant neoplasia with local destruction of tissue and metastases. As most cysts develop within the liver, hepatopathies with subsequent liver failure are the most common complication of infection. The spread of cysts through the liver – and subsequent pathology – is similar to a hepatic carcinoma and can initially be misdiagnosed as such.

Surgery remains the treatment of choice in human disease combined with daily benzimadazoles, such as albendazole. Despite significant advances in treatment over the past two decades, infected individuals can still expect a significant reduction in life expectancy.

Control and prevention of human disease

Monthly chemoprophylaxis of domestic dogs remains the mainstay of disease control. Although foxes are the reservoir of infection and are being increasingly urbanised, the infected microtine vole population is largely rural. Domestic dogs act as a 'bridging' host, becoming infected while walking in these more rural areas and then bringing the parasite into contact with people in more urban environments.

The treatment of choice to eliminate infection in canids and felids is praziquantel and is highly efficacious with a single dose. Even after treatment, however, the faeces will remain a potential zoonotic risk while the parasite is expelled, so people in contact with possibly infected pets should be made aware of this, and that even praziquantel treatment is not guaranteed to be 100 per cent effective.

Cats infected with *E.multilocularis* have a lower worm burden with lower fecundity than canids. Eggs that are produced have also been demonstrated to be more likely to be non-infective in experimental infections. Domestic cats, however, often have a close human bond and outdoor cats frequently predate. For these reasons, cats travelling abroad to endemic countries should also be treated.

On small islands and in isolated populations of canids, praziquantel baiting of the definitive host population has been considered; but in most cases elimination of the parasite from endemic areas is not practical because of the large reservoir in the rodent population (Deplazes et al, 2003).

As well as chemoprophylaxis, good hygiene is vital to prevent transmission. People travelling and living in endemic areas may become exposed through eating unwashed contaminated fruit and vegetables or through playing in contaminated environments. Good hand hygiene and thorough washing of food intended to be eaten uncooked will help to prevent exposure to infection through these routes.

Prevention of *E.multilocularis* becoming established in the UK

The UK is ripe for *E.multilocularis* to become established. We have a growing fox and microtine vole population that is more than large enough for the parasite to become endemic across the country. Furthermore, the long incubation period of subsequent human disease means that *E.multilocularis* would be well established before endemic medical cases became apparent.

These factors, in combination with a lack of safe, cheap diagnostic tests for routine screening, would make preventing *E.multilocularis* becoming endemic difficult – if not impossible – to achieve if it entered the UK. Avoiding endemicity, therefore, relies on preventing entry of the parasite in the first place.

The Pet Travel Scheme currently still requires dogs to be treated with praziquantel prior to entry into the UK. The time period of treatment has been extended from 48 hours

"Even after treatment, however, the faeces will remain a potential zoonotic risk while the parasite is expelled, so people in contact with possibly infected pets should be made aware of this"

to between one and five days before return to the country. This does allow a window of opportunity for reinfection to occur after treatment as the plasma half-life of praziquantel is short; but this regimen has, to date, still prevented endemic foci from developing in the UK.

Torgerson and Craig (2009) demonstrated that if this compulsory treatment is abandoned altogether, then it is almost inevitable that *E.multilocularis* will be introduced into the UK. They showed that for every 10,000 dogs travelling on a short visit to an endemic country, such as Germany, the probability of at least one returning with the parasite is approximately 98 per cent. This probability increased to over 99 per cent if dogs had been longer-term residents.

The epidemiological case for maintaining compulsory praziquantel treatment before dogs enter the UK is, therefore, still a strong one and the importance of this treatment, as well as monthly praziquantel treatment while abroad, should be stressed to clients travelling on PETS.

Conclusions

E.multilocularis is currently considered one of the world's most lethal zoonoses (Craig, 2003), remaining on the World Health Organisation's top 17 neglected tropical diseases. It is spreading across Europe and, although the UK is currently free of infection, this is unlikely to remain the case if compulsory treatment with praziquantel for dogs before entry into the UK is dropped.

Maintaining this provision, therefore, remains vital even in the face of EU pressure to relax pet travel regulations. The means by which people and dogs are being exposed to *E.multilocularis* is changing – with increased urbanisation and spread of the parasite – so continued client education, research into new diagnostic tools and vigilance are essential if the UK is to remain free of infection. ■

PPD Questions

1. In *E.multilocularis* sylvatic life cycles, which animals act most commonly as intermediate hosts?
   A. humans
   B. canids
   C. birds
   D. rodents
   E. ruminants

2. In what time period before return to the UK should *E.multilocularis* treatment be administered by a veterinary surgeon?
   A. 1-2 days
   B. 1-3 days
   C. 1-4 days
   D. 1-5 days
   E. 2-5 days

3. Which of the following countries has *E.multilocularis*-free status?
   A. Denmark
   B. Finland
   C. France
   D. Poland
   E. Germany

4. In the year 2000, how many human cases of *E.multilocularis* infection were recorded in Europe.
   A. 159
   B. 259
   C. 359
   D. 459
   E. 559

5. After 10,000 dogs had made a brief trip to an *E.multilocularis* endemic country, how likely was it found that one would return to the UK with *E.multilocularis* if not treated?
   A. 90%
   B. 95%
   C. 98%
   D. 99%
   E. 99.8%

Answers
1.D 2.D 3.B 4.E 5.C

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Tom graduated from the University of Edinburgh in 2014 and is currently studying for a PhD in canine genetics at The Roslin Institute, Edinburgh. His main interests lie in identifying the genetic determinants of canine skull morphology and associated morbidities.

*Suggested Personal & Professional Development (PPD)

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GENETICS

Harnessing advances in genetics to improve canine health

It is not surprising that the domesticated dog is widely known as 'man's best friend'. Dogs offer companionship and protection, as well as having the capacity to be trained as guide dogs, to aid search-and-rescue exercises, to help detect contraband, herd livestock and hunt. If that were not enough, it has become more apparent in recent years that dogs – especially their genetics – also play a major role in advancing our understanding of a range of disciplines, including medicine, forensics and canine evolution.

Medical advances

At the forefront of interest is human and canine health. Dogs receive the highest level of health care, second only to that given to their human owners (Patterson, 2000). They are reported to suffer from over 450 diseases – approximately 360 of which correspond to diseases seen in humans, including complex traits such as diabetes and certain cancers (Shearin and Ostrander, 2010). This observation, coupled with advances in technology, has accelerated the interest in recent years to study canine DNA to help understand human and companion animal health.

In 2005, the DNA sequence of a Boxer dog called Tasha was determined to reveal the complete set of dog genes – the 'canine genome'. This has a remarkable resemblance to that found in humans with the added benefit of being 100 times simpler.

One of the most widely adopted approaches to studying the canine genome is a genome-wide association study (GWAS); which compares the DNA sequences of affected and non-affected individuals to identify errors in the DNA – or 'mutations' – linked with specific diseases or characteristics. This has proved to be particularly effective in identifying genes that are most likely to contain disease-causing mutations.

Case Study 1: Cleft lip/palate

Cleft lip – with or without cleft palate – is the most common facial birth defect occurring in up to one in 1,000 births in humans (WHO, 2001) and affecting various dog breeds, particularly the short-faced, brachycephalic breeds. A study by Wolf et al in March 2015 compared DNA samples from 112 healthy dogs and seven Nova Scotia duck tolling retrievers with cleft lip/palates. This study found a mutation in a specific bone-related gene to be linked with the syndrome.

In human cases of cleft lip/palate syndrome, mutations in the human version of the same gene were also found; this fact highlights how advances in canine genetics complement those in human genetics.

So what is there to gain from finding the mutations that cause diseases?

Answer: a great deal!
If a given gene mutation is known to cause a disease, then it is possible to develop a simple genetic screen to test for it. This could give a conclusive diagnosis for either human or canine presentations of the disease to then allow a rapid enrolment in appropriate treatments. Alternatively, the discovery of new disease-causing mutations could lead to the development of novel treatments that target pharmacological pathways which may have been previously overlooked.

Gene therapy

Identifying new mutations can also help develop another treatment strategy – gene therapy. Gene therapy involves delivering healthy copies of one or more genes into the body to counteract the disease-causing effects of the mutated gene. This type of therapy remains very much in its infancy; however, canine gene therapy

"The discovery of new disease-causing mutations could lead to the development of novel treatments that target pharmacological pathways that may have been previously overlooked"

has already been shown to control hyperglycaemia in canine diabetes (Callejas et al, 2013) and to restore the vision to dogs with early onset blindness (Acland et al, 2001).

As with any disease, prevention is better than cure. Having a greater understanding of the genetic mutations causing canine diseases puts us one step closer to implementing this goal effectively. Following genetic studies such as those in Case Study 1, numerous companies are able to provide commercially available tests for dog owners. These tests determine whether male and female dogs carry the genetic mutation that either causes or increases the risk of their puppies having specific diseases.

This then allows owners to make informed decisions regarding the selection of animals to breed to reduce the likelihood of disease being transmitted to their offspring. The combination of genetic studies supported by testing kits for breeders has proved very successful in reducing the prevalence – or even eliminating – simple genetic diseases.

Forensics

Since its development in the 1980s, DNA fingerprinting has become a cornerstone in human forensic investigation. The practice is a quick and easy way to identify an individual using their DNA, since no two individuals have the same DNA sequence (with the exception of identical twins). DNA fingerprinting has played an inherent role in many convictions of complex criminal cases – both in reality and in glamourised television dramas!

Dog ownership in the UK has gradually increased over the past decade, so that today, on average, every one in four homes has a dog. The growing presence of dogs in our daily lives means they are increasingly likely to be involved in criminal incidents. This could either be as a victim of animal abuse or theft, as a perpetrator in an attack, or act as a link between a suspect and a crime scene.

Unfortunately the use of DNA fingerprinting in canine forensics has not shared the same success as it has in human forensics. However, within the last five years, a DNA fingerprinting kit has been developed and tested reliably for dogs (Ogden et al, 2012). Characteristics of this canine fingerprinting kit draw many parallels to those used for humans. It compares 18 different regions of canine DNA called 'short tandem repeats' that are known to be highly variable between individuals.

By analysing each of these 18 regions – including an additional site to determine sex – it is possible to identify conclusively an individual dog from a single DNA sample. Such efforts in the field of canine forensics have contributed to a growing wildlife DNA forensics database established to assist in wildlife crime investigations.

Breed and parentage

Specific regions of DNA, called DNA markers, can be used to examine the genetic make-up of dog breeds. Studying these markers has shown that the Jack Russell terrier is the most genetically diverse breed of dog; whilst the Boxer and West Highland White terrier are two of the most genetically distinct (Mellanby et al, 2013).

Commercial testing kits also use DNA markers to predict the breed composition of dogs when the owners are unsure. Owners can submit saliva samples containing DNA from their pet to testing companies for analysis. These tests can prove effective at determining the breed of purebred dogs – they may, however, only offer a limited insight into the breed

>>>

Case Study 2: Eliminating canine leukocyte adhesion deficiency

Leukocyte adhesion deficiency is a genetic disorder that leaves a child highly susceptible to life-threatening bacterial infections. The disorder is also observed in dogs with a particularly high prevalence in Irish setters. In 2000, a test was made available to Irish setter breeders to determine whether their breeding populations carried the genetic defect.

This screening process proved so successful that the UK Kennel Club made the test a requirement for Club registration in 2005 which subsequently led to the eradication of canine leukocyte adhesion deficiency in UK Irish setters.

composition of mixed-breed dogs.

Other genetic tests can be used to establish the parentage of a puppy. Dogs are a diploid species, meaning they have two copies of nearly every gene – one from each of the dam and sire. By comparing the copies of genes in the puppy with the potential parent candidates, it is possible to conclusively identify the puppy's parents.

Canine evolution

The wide diversity we see across dog breeds today is a very recent addition to overall canine evolutionary history. Most of the dog breeds we recognise today are of European descent, having only been established as recently as 200 years ago when dog breeding became popular during the Victorian period.

Despite this, the companionship between man and dog stretches much further back to when wild wolf populations were domesticated across the Northern hemisphere. In fact, it is argued that the domestication of wolves was a vital role in helping humans to progress from hunter/gatherers to what we are today.

Establishing an accurate time scale and geographical origin for the domestication of the wolf continues to be a moot point, with canine genetics giving more insight. Archaeological remains found in Belgium and Ukraine suggest domestication may have begun approximately 30,000 years ago in Europe (Ovodov et al, 2011).

Meanwhile, genetic approaches have suggested that domestication occurred within the last 11,000 to 32,000 years in the Middle East or East Asia. These findings have been generated by determining the similarity between the DNA of European and Asian wolves with modern dogs. As it stands, however, the precise time frame and geographical origin of domestication remains broad; but further work with ancient wolf breeds is set to refine estimates.

The cusp of much yet to come

Advances in genetic technologies and the establishment of the canine genome have demonstrated that the domesticated dog can teach us so much.

In addition to combating wildlife crime and studying the evolutionary relationship between man and dog, genetic studies have allowed for the eradication of diseases within breeds, whilst giving insights into our own health. This, now thriving, facet of canine genetic research undoubtedly has considerably more to offer. ■

"As it stands, however, the precise time frame and geographical origin of domestication remains broad..."

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After graduating with a Degree in Pharmacology in 2002, Helen qualified as a RVN in 2005 and began a six-year stint as a locum nurse working nationally and internationally in a variety of settings.

In September 2013, she qualified as a human-centred nurse and works at Papworth Hospital NHS Foundation Trust. After two years working in intensive care, she has recently moved to the transplant continuing care team where she helps to care for patients post-transplant. She is also part of the organ retrieval team, who are on call to attend hospitals across the UK to facilitate the collection of organs from deceased donors.

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NURSING

Communication: a multidisciplinary approach

It all started the week before we moved house. We had exchanged contracts and a moving date was set. Along with all the normal excitement associated with such an event, there was an extra bonus for me, the possibility of having pets – specifically, a cat or kitten.

While on my lunch break at the hospital, I perused the website of the local cat rescue services to see if our new feline friend peered out at me, to find out what the procedures were, which forms to fill in, and so on. The idea spread around the office and soon I had a couple of colleagues peering over my shoulder inviting me to select *their* favourite.

A tabby was pointed out as "cute" – a "rum old boy" I mused out loud seeing the features associated with an elderly cat, his eyes slightly too large for his head, chunks missing from his ear, the knowing expression on his face. I hovered the cursor over the photo to reveal the cat's age – 17 years old. My colleagues were impressed! How could I tell the age of a cat, just from looking at it?

I exploited my party trick, spotting feral or nervous cats from their wide eyes and slightly startled expressions, young cats with their lesser-evolved features, tough ex-tom cats and cats I suspected had health problems.

This skill – one that I am sure every veterinary professional working closely with cats could copy – was really impressing my colleagues. It led to a discussion on working with species that can't talk. There was a full debate on the assessment skills required to work with animals and which of those skills are used across the species.

Listening with our eyes

When I reflect on my time in practice as a RVN, I can see any number of instances where we nurses played detective. There were the obvious – investigations and tests, or speaking to owners to establish a favourite food or litter substrate. However, there were also the much more subtle observations that helped us in our endeavours. The way a patient sat, the way it curled its tail, a glance, a sound.

Despite now working with animals who *can* talk, I can see how my communication skills with my human patients have been influenced by my experiences with animals. Close observation was essential when I worked in the critical care department. It came easily to me to watch an intubated, postoperative patient who was beginning to wake.

The key was to watch for a signal, a movement, an open eye, a glance, or a sound. Any signal that would tell me they were trying to communicate. It was important to watch so that I noticed before they reached the dangerous stage – when their hand would slide up to their face and yank at the endotracheal tube, an action that was a silent yell to "get this thing out".

If you could anticipate that moment when the patient was awake but hadn't quite understood the presence of the tube, many would be soothed with a calm explanation. Many would tolerate the foreign body down their throat, giving us precious minutes to check an arterial blood gas, check their responses and adjust the ventilator to ensure that they were breathing independently before we extubated them.

Heeding the cues

There is so much that can be conveyed without words. Just last week, we had to break bad news to a young patient. His heart, transplanted 20 years ago, is starting to fail. Statistically, that time frame is a great clinical outcome; but to him, I am sure that those 20 years have flashed by.

His parents were waiting in the reception. They knew without needing to be told. As soon as he walked out, they knew. The signals were all there. The fact that I walked out with him, my hand on his back. Our posture, our expressions, the way we walked, all gave us away. I looked up and saw two pairs of eyes staring right at me. I knew they knew. Their

"Despite now working with animals who can talk, I can see how my communication skills with my human patients have been influenced by my experiences with animals"

eyes moved to their son who, at 40 years old, was coming to the end of his life. Tears filled their eyes and they knew, without words.

I remember a doctor friend of mine remarking on the psychic ability of one of his patients who was a vet. This vet had diagnosed a problem simply by watching how a gentleman had sat in the waiting room. The doctor had been impressed, and the vet explained how she had been sat next to the patient and she had noticed how he had shifted his weight often, moved a little with a grimace at the corners of his mouth. The doctor reflected that it had reminded him to look at his patients as well as to listen to them.

I am sure that my experience as a veterinary nurse has heightened my observational skills and, indeed, my communication skills. We all know that reading an animal correctly, while not a finite science, can go a long way to making life much easier and that reading a situation incorrectly can lead to battles – a cat stuck on the top of a stack of kennels, a bleeding thumb and a procedure abandoned.

It is only now as I learn more formally about communication skills as part of my outreach role on the wards, I realise that all this time, while working with animals, I have been practising a core communication skill – looking and listening for cues. Bramhall (2014) explains that cues are hints, and can be words, gestures or body language. She goes on to highlight their importance, saying that observing verbal and non-verbal clues can be important to identifying patient needs.

Breaking bad news

One of the most difficult types of communication is breaking bad news. The critical care unit is a place where a phone call can be as important as running for the defibrillator. The family of a deteriorating patient must be informed, they must be given a chance to say their goodbyes. It was while I was on critical care I realised I didn't really know very much about how to break bad news. Through my veterinary career, I had relied on the veterinary surgeons and during my nursing training, relied on more senior nurses.

I was anxious at the prospect and aware that doing it badly could cause problems. On consulting the literature, I learned that there are many resources to help with breaking bad news. I learnt that the evidence tells us that good communication skills *can* be learnt – they are not necessarily something you have or don't have. Interestingly, I also learnt that staff who felt ill-equipped to communicate with patients and/or their loved ones, often suffered psychological stress and anxiety at work (Taylor et al, 2005).

After spending some time reading, I concluded that there are generally three main points to breaking bad news well: preparation, empathy and being aware that bad news is subjective. I learnt quickly on the ICU, that preparing people to receive bad news helped. From a practical point of view, telling them while they were sitting down stopped them falling down. Emotionally, it helped if I ensured all the right people were in the room to hear the news so they could support each other.

Equally, I learnt from experience, that I needed to prepare myself for whatever the person involved might do or say. I have had tears, screams, laughter, and questions about parking tickets when I have made that bad news phone call. A useful thing I always bear in mind is something I learnt from my

> "I realise that all this time, while working with animals, I have been practising a core communication skill – looking and listening for cues"

animal patients – anger or aggression can mask fear. The reason people behave the way they do is not always for the reason you think.

The literature goes on to talk about empathy. Defined by Bramhall (2014) as 'the ability to set aside your own thoughts and feelings on a subject', it facilitates being able to try and appreciate the thoughts and feelings of others. However, this is not always easy. In veterinary nursing, when owners can make the ultimate decision to end the life of their pet, it can be hard for those who have cared for that pet to deal with.

To facilitate supporting both the patient and owners, we have to try and put our own feelings aside. Additionally, there is an argument that being able to put our own feelings aside can improve emotional intelligence and prevent nursing staff – of animals or people – becoming regularly distressed and upset by what they experience at work.

Be prepared

Finally, I learnt that bad news can manifest itself in all guises. Fallowfield et al (2002) defined bad news in healthcare as 'any bad, sad, or significant information that alters negatively people's expectations or perceptions of their present or future'. Specifically I realised that you can never anticipate what each different person will perceive as bad news.

I was reminded of this recently, when I admitted

"After spending some time reading, I concluded that there are generally three main points to breaking bad news well: preparation, empathy and being aware that bad news is subjective"

a patient for treatment of rejection of her transplant. It wasn't the rejection that made her cry, it was the fact that owing to the combinations of visiting hours and working hours she would only be able to see her daughter for two hours a day. Compared to the potential clinical implications of her type of rejection, I never imagined that something else could be worse.

This point applies directly to veterinary nurses too. Consider sexing kittens, telling an owner that Daisy now needs a different name can cause distress. A diagnosis or suspicion of a food allergy could alarm a couple on a tight budget, anxious that their beloved dog will need a diet they cannot afford. A dental check that concludes that the elderly cat needs a general anaesthetic. Each of these examples are things we may accept readily in practice, but that could have profound effects on the owners of these animals and would be described as 'bad news'.

By watching for the cues that owners display, the non-verbal signs, evidence of shock, surprise or concern, a gasp or tears are all key cues that they feel upset by what you have told them. By interpreting those cues correctly, you can, most importantly, identify their concern and address it. You can adapt your style accordingly and hopefully help them get over their grief.

Observation is a transferable skill

Communication can be difficult. It's interesting. As I wrote my application for human-centred nursing, I discussed many transferable skills from veterinary nursing. However, I have to say that I never dreamt that communication with my patients was one that would easily jump the species barrier. Yet after a few years as a registered nurse, I can see that my veterinary nursing experience taught me observational skills, patience and, most importantly, it taught me to never stop watching. ■

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PHARMACOVIGILANCE

Adverse events – vets have a key role

Although veterinary medical products are required to be safe, safety does not mean zero risk. This first article of a three-part series sets the scene.

A safe product is one that has reasonable risks, given the magnitude of the benefit expected and the alternatives available. A Competent Authority – the Veterinary Medicines Directorate (VMD), for example – approves a product when it judges that the benefits of using it outweigh the risks for the intended population and use.

Once veterinary medical products are on the market, however, ensuring safety is principally the responsibility of veterinary professionals and animal owners, who make risk decisions on an individual – rather than a population – basis. They are expected to use the labelling information (Summary of Product Characteristics, Data Sheet, Product Insert) to select and use products wisely, thereby minimising adverse events (AEs).

A pharmacovigilance system is in place to monitor veterinary medicines marketed in each EEA country and to ensure that pharmacovigilance data – in particular about adverse events in treated animals – are collected and scientifically evaluated.

The scope of pharmacovigilance covers:

- adverse events
- lack of efficacy
- off-label use
- human reactions
- potential environmental problems
- investigation of the validity of the withdrawal period.

All of these are potential consequences, arising from the use of the product, which may have an impact on the evaluation of the benefits and risks. It is imperative that veterinary surgeons are aware of – and understand the definitions of – adverse events and lack of efficacy.

Why do we need pharmacovigilance?

There are limitations inherent in the pre-authorisation clinical studies that are carried out.

Short duration

This means that effects which develop with chronic use, or those that have a long latency period, are impossible to detect.

Narrow population

Generally, studies do not include special groups – young or old, for example – and are not always representative of the population that may be exposed to a product after approval.

Narrow set of indications

The indications for which efficacy is being studied are invariably restricted and do not cover actual evolving use.

Small size

Owing to the relatively small population size, effects that occur rarely are very difficult to detect. At least 30,000 animals need to be treated with a product to discover (to the power of 0.95) at least one animal with an adverse event which has an incidence of 1 in 10,000 (**Table 1**). These studies, therefore, seldom detect or define the frequency of all important adverse events.

On top of this, when a product is launched and used in practice, the following factors come into play:

- larger number of animals
- use of other products at the same time
- off-label use – low dose or overdose; shorter or longer treatment regimen
- age of animals
- health status of animals.

Table 1. Number of exposed animals needed to detect true frequencies of adverse events (AEs)

	Statistical power			
Frequency of AE	95%	90%	80%	63%
1 in 100	300	231	161	100
1 in 500	1,500	1,152	805	500
1 in 1,000	3,000	2,303	1,610	1,000
1 in 5,000	15,000	11,513	8,048	5,000
1 in 10,000	30,000	23,026	16,095	10,000
1 in 50,000	150,000	115,130	80,472	50,000

So, in essence, the safety profile of a veterinary medicine evolves over its lifetime on the market.

Spontaneous reporting of AEs is an inexpensive and effective method for ensuring continued safe and effective use of veterinary medicinal products following their introduction to the market place. The gathering of relevant information, however, is dependant on the contribution and co-operation of veterinary surgeons and other animal health professionals.

Do we report?

In 2014, the VMD received 5,594 animal-related reports. Of these 4,684 were associated with companion (pet) animals, 863 with production (food-producing) animals and 36 with exotic animals (**Figures 1** and **2**).

Based on the number of veterinary practices in the UK, this equates to about one AE report per practice per year. So in essence there is under-reporting.

Veterinary professionals must recognise and realise their key role in detecting and reporting adverse events. It is assumed that veterinary professionals are working to Good Veterinary Practice standards and there must be a willingness to report – including spending the time required to collate an accurate history and to submit the report.

For a report to be valid, the following four pieces of information are required:

- identifiable reporter (e.g. veterinary professional, animal owner)
- animal details – species, sex, age
- suspect product details – name and authorisation number, dose used
- event details – description of what occurred.

This list cites the minimum requirements and veterinary professionals should strive to obtain as much data as possible about any AE (**Table 2**).

From a veterinary professional's point of view, *suspicion* that a product may be related to an adverse event is sufficient reason to submit a report.

It is imperative too that veterinary professionals know the contact details of the companies whose products they use and those of the VMD's Pharmacovigilance team. They can also report AEs to the VMD online at www.vmd.defra.gov.uk/adversereactionreporting/. There are downloadable Word versions of forms available for an Animal AE or a Human Reaction and these then can be completed and forwarded by post.

Do vets receive AE reports from clients?

Unfortunately, veterinary professionals do not always receive reports of adverse events from their clients. Rather what they receive are 'customer complaints'! In this situation, the majority of practices want help and support to investigate the complaint, so they turn to the companies.

The reporting of undesirable side effects is not compulsory everywhere in Europe and this can lead to an underestimation of a problem. An isolated incident may seem anecdotal, but if several similar events occur, that can change everything.

An example of AEs that are not reported is vomiting and/or diarrhoea in dogs during treatment with non-steroidal anti-inflammatory (NSAID) medicines.

The first time it occurs the veterinary surgeon may telephone the company, which will probably advise that the treatment is withdrawn – and the clinical signs disappear. The next time the veterinary surgeon sees such a case, he or she just withdraws the treatment but does not report the AE. Or they may already be aware that vomiting and/or diarrhoea are known adverse events and withdraw the treatment, but not report it to the company.

Table 2. Key information for a suspected adverse event report

- person who administered the product
- reason for treatment
- dosage, route and site
- products administered concurrently
- time between treatment and reaction
- reaction description
- number of animals with signs
- treatment of the reaction
- outcome.

So, it cannot be emphasised enough that in order to ascertain their true incidence, all AEs should be reported.

Do veterinary professionals recognise all adverse events that occur?

Probably not. A serious adverse event can be easy to identify if it involved death of the animal. However, a serious adverse event can also be 'life threatening, disabling, incapacitating, or result in permanent or prolonged signs in the animal treated.'

Figure 1. *Proportion of reports received for different animal groups in 2014. (Source: VMD)*

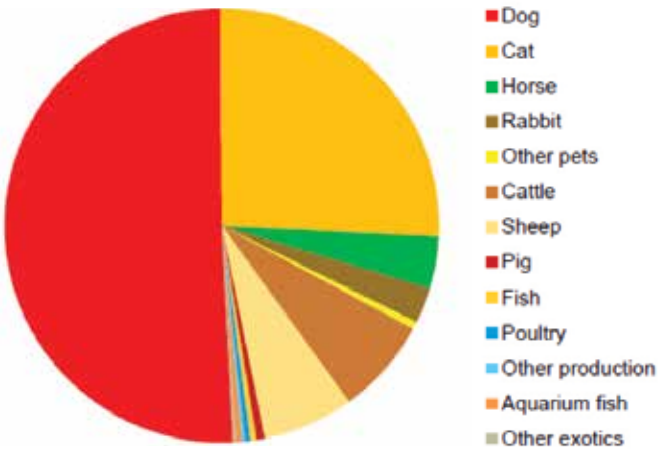


Figure 2. *Therapeutic groups of products reported in animal AE reports in 2014. (Source: VMD)*

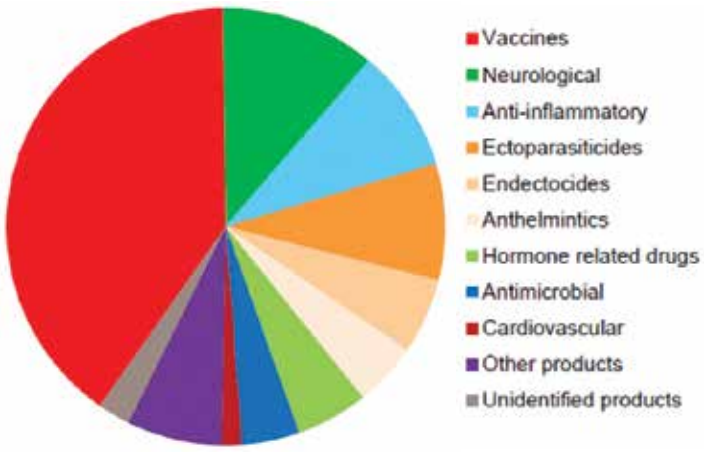


Table 3. Serious non-fatal suspected adverse events

- anaphylaxis within a few hours – clinical signs may vary according to species
- blindness (partial, temporary or permanent) in all species
- collapse immediately and lasting longer than 10 minutes in all species
- convulsions and/or other neurological signs occurring within a few hours in all species
- sarcomas at administration sites in cats
- severe epileptic fits and lethargy occurring within a few hours in all species
- severe respiratory distress occurring immediately in all species
- severe pyrexia occurring immediately in all species
- severe photosensitisation occurring within a few days in cattle and sheep
- severe gastro-enteritis occurring within a few days in all species
- acute mastitis occurring within a few days in cattle and sheep
- acute metabolic disorders, hepatic or renal failure occurring within a few days in dogs and cats
- significant reduction in physiological function occurring within one week and lasting for a longer period (e.g. persistent anorexia, circulatory collapse, reduced milk yield, reduced egg production, reduced growth rate, anaemia, blood dyscrasias)
- birth defects with sequelae (e.g. deafness or blindness) in all species
- fish body deformities.

So what about those serious, non-fatal events? The VMD has published a list, for guidance, of examples of non-fatal AEs that could be considered to be serious if they occurred in a time relationship with the administration of a veterinary medicine (**Table 3**).

Based on this guidance you could pose the question, have you seen any cases of reduced growth in an animal(s) within a week post-treatment? Could it have been related to the product(s) used? The guidance indicates that the product(s) may be one of a number of possible diagnoses. However, you should report it. The golden rule with regard to AE reporting is 'If in doubt, report it'.

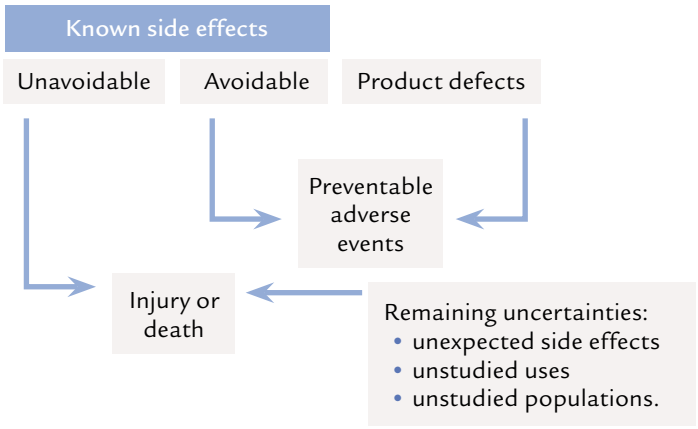
Off-label use

The occurrence of AEs associated with off-label use/overdosage emphasise the importance of following the recommendations declared on product labelling. While in some cases the lack of authorised veterinary medicines may necessitate the use of an alternative indicated for another species, such usage should only be undertaken if warranted and under strict veterinary supervision.

Benefits of AE reporting

The provision of information about AEs in animal pharmacovigilance plays an important role in the sound and safe use of veterinary medicines. Knowledge of the adverse effects of veterinary medicines is vital to ensure effective treatment. It is vital that, prior to treatment, veterinary professionals communicate the potential adverse effects of a product to the animal owner.

Figure 3. *Sources of risk from veterinary medicinal products. (Adapted from FDA, 1999)*



Adverse events are preventable

Most events and deaths associated with the use of veterinary medical products result from their known side effects. As mentioned earlier, veterinary professionals are expected to use the labelling information to select and use products wisely, thereby minimising adverse events. For example, the data sheets for vaccines have statements along the following lines: 'Administer only to animals in good health' or 'Only healthy animals should be vaccinated'.

It is imperative that veterinary professionals ensure that animals are in good health before vaccination as vaccination of unhealthy animals can lead to adverse events or a lack of efficacy. In 2014 about 13 per cent of AE reports received by VMD involved unauthorised use of the product and the majority of these were probably preventable (**Figure 3**).

Some side effects are unavoidable, but others can be prevented or minimised by careful product choice and use. In the human field, it is estimated that more than half of the side effects from pharmaceuticals are avoidable.

Conclusion

Post-authorisation surveillance (pharmacovigilance) based on spontaneously reported data is a powerful tool for detecting adverse event signals of direct clinical impact. It is dependent not only on veterinary professional participation, but also on the quality of reports that are submitted.

By viewing adverse event reporting as a professional responsibility, and recognising that the quality of data generated from spontaneous reports is determined by the quality of the information submitted, veterinary professionals can play a major role in improving animal health, welfare and public health. ■

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Anti-diabetic drugs in dogs and cats

With the increasing prevalence of diabetes in humans – an estimated four million people in the UK – it is likely that companion animals will be exposed to drugs used to treat this condition; not to mention overdoses of their own medicines. Although the Veterinary Poisons Information Service (VPIS) hears of relatively few cases (528 since 2010 which represents 0.7% of all enquiries), some of the agents used are dangerous. These could – and occasionally do – cause severe poisoning.

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Jane is an information scientist who has worked for the Veterinary Poisons Information Service (VPIS) and the human poisons service at Guy's Hospital, on and off since 1984, and has also worked in the pharmaceutical industry. Jane was a founder of the veterinary service in the 1980s and has recently returned to work for the service in the 24-hour rota team.

Diabetes is a complex illness, but falls into two main types: insulin dependant (type I) and non-insulin dependent (type II, or NIDDM). The three commonest types of anti-diabetic drug involved in enquiries to VPIS are insulin, metformin (a biguanide) and sulphonylurea agents (**Figure 1**).

In addition there are newer agents about which we also receive enquiries.

Sodium/glucose cotransporter 2 (SGLT2) agents

These agents (such as empagliflozin) reduce renal glucose reabsorption and, therefore, increase renal excretion of glucose rather than causing a drop in blood glucose. These 'gliflozin' drugs are currently available and used in humans. In theory, acute exposure should present little hazard and the three dog and one cat case reported to VPIS to date support this.

Glitazones

These agents (such as pioglitazone and rosiglitazone) are currently a 'third-line' medicine. They may drop blood sugar levels, but in the limited number of cases reported to VPIS (20 single agent exposures, all in dogs) there was no evidence of this. As they act by increasing insulin entry into cells, reports of hypoglycaemia may, in fact, be the result of mixed exposures.

Insulin

The primary treatment for type I, insulin-dependent, diabetes mellitus (IDDM) is insulin, by injection. It is administered by injection because the oral bioavailability is extremely poor, with most, if not all, being destroyed in the gut (Dollery, 1998).

Any accidental oral exposure, from a toxicological point of view, can probably be discounted. The VPIS has very occasional reports of toxicity from oral exposure, but this is likely to be from an oral lesion or injection into the mouth from an ingested pen. However, accidental (or otherwise) parenteral exposure could cause profound and prolonged hypoglycaemia; treatment would be sugar/glucose and monitoring blood sugar.

VPIS has recorded a small number of cases where accidental overdoses were given by veterinary surgeons.

Figure 1. *Enquiries to VPIS.*

Of the 528 enquiries associated with 'anti-diabetic' drugs since 2010:
- metformin-338
- sulphonylurea-134
- insulin-41.

Total number of all poisoning enquiries during that period = 79,493.

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POISONS

Metformin

Metformin is a biguanide that acts by suppressing hepatic glucose production via decreasing hepatic glycogenolysis. In humans, metformin can cause type B lactic acidosis in both therapeutic use and in overdose, but the exact mechanism is unclear and is rarely, if ever, reported in dogs or cats.

In cats, peak plasma concentrations occur at about one hour after ingestion and oral bioavailability varies from 35 to 67 per cent (mean 48%). The mean terminal half-life is 11.5 hours and most is excreted though the kidneys. The equivalent data for dogs are not available.

Effects following ingestion are likely to be rapid in onset (1-2 hours) and to last about 18 to 24 hours (Heller, 2007).

Metformin is unlikely to decrease blood glucose because it is anti-hyperglycaemic rather than hypoglycaemic. It causes gastrointestinal irritation, with vomiting being the most common sign reported in animals (VPIS Cases, Heller, 2007); there may also be diarrhoea, lethargy and inappetence. This is usually all that is reported in symptomatic animals.

Less common effects include hypotension, hypothermia, pale mucous membranes and hind limb ataxia tremors (VPIS Cases, Heller, 2007). Gastrointestinal haemorrhage has been reported in humans but not in any cases reported to VPIS.

In humans, lactic acidosis is the most significant effect seen in overdose. This has not been reported in animals (VPIS Cases, Heller, 2007). The doses taken relate poorly with severity of poisoning; underlying risk factors – such as renal failure, chronic cardiac or pulmonary disease – may be as important as the dose and appear to be the main determinant of outcome in humans (Lalau et al, 1998). Many cases reported to VPIS remain asymptomatic.

A recent review of cases in dogs (reported to VPIS since 1998) where follow-up data are available and where metformin alone was reportedly taken, is summarised in **Table 1**.

Intervention is recommended for intakes of >50mg/kg in cats and >100mg/kg in dogs. Treatment comprising emesis and use of charcoal is recommended if animals are seen within an hour or two – of course, emesis will not be necessary if the animal has already vomited (**Table 2**).

Although hypoglycaemia is a rare complication, it would be wise to check blood sugar levels and correct if necessary (**Table 3**). Again, although rare, lactic acidosis is a potentially serious complication and dogs who show signs of acidosis (either a measured acidosis or panting) should be given intravenous bicarbonate (**Figure 4**).

Otherwise treatment should be symptomatic and supportive.

Table 1. Outcome of cases involving metformin in dogs (VPIS)

Outcome	Number of cases
Euthanised	1
Fine throughout	41
Full recovery	17
Improving (but ongoing)	1
No follow up	4
TOTAL	64

Table 2. Therapeutic guidance

Agents	Dosage guidelines
Emetics	Dogs – apomorphine 0.05mg/kg IV or 0.1mg/kg IM. Cats – xylazine 0.6mg/kg IV or 1mg/kg IM or SC; or medetomidine 3-5µg(micrograms)/kg IM; or dexmedetomidine 3-5µg(micrograms)/kg IM.
Adsorbents	Activated charcoal 2g/kg orally. BCK granules 6-18g orally, 2-3 times daily.

Table 3. Normal biochemistry values (Blood & Studdert, 1988)

	Dogs	Cats
Glucose	55-102mg/dl (3.1-5.7mmol/L)	55-114mg/dl (3.1-6.3mmol/L)
Sodium	137-149mmol/L	147-156mmol/L
Potassium	3.7-5.6mmol/L	4.0-4.5mmol/L
pH (serum) (urine)	7.31-7.53 5.50-7.50	7.32-7.44 5.50-7.50

Sulphonylureas

There is limited information available regarding sulphonylurea toxicity in dogs or cats. The oral LD_{50} for glipizide is greater than 4mg/kg in all animal species tested (Plumb, 2015).

Glibenclamide

There have been a limited number of cases involving this agent reported to VPIS. Eight cases have been recorded with glibenclamide as a single agent, seven of which resulted in an asymptomatic animal (dose range 5-10mg) – six of these were dogs and one a domestic short-haired cat.

A 6kg dog ingested 20mg of glibenclamide (3.3mg/kg) and developed hypoglycaemia (2.5mmol/L). The dog made a full recovery on treatment with activated charcoal and glucose.

Gliclazide

Forty-seven cases have been reported to the VPIS with

gliclazide as a single agent, 31 of which remained asymptomatic (66%). Hypoglycaemia has been reported in 10 cases; while other effects included convulsions, hyperthermia, rash, collapse and dyspnoea. Only three cases were in cats, of which two were hypoglycaemic.

Glimepiride

Eleven animals are reported to have taken this agent alone – all dogs. Of these, a 7.25kg terrier developed mild hypoglycaemia (value undefined) after ingesting 2.5mg of glimepiride (2.9mg/kg). It made a full recovery on treatment with glucose.

A second dog also took glimepiride, but was lost to follow-up.

Glipizide

Twenty-one cases have been reported with glipizide as a single agent, four of which resulted in an asymptomatic animal. A 3.3kg Jack Russell terrier ingested 80mg of glipizide (24.2mg/kg) and developed vomiting only. The animal made a full recovery on treatment with activated charcoal and sucralfate. Ingestion of 5mg of glipizide in a 5.3kg cat (0.94mg/kg) resulted in an asymptomatic animal; however, 2.5mg in a 5kg cat (0.5mg/kg) resulted in ataxia, collapse and confusion. Both cats made a full recovery.

Tolbutamide

Only two cases have been reported to VPIS involving tolbutamide taken alone. A 60kg Rhodesian ridgeback ingested 500mg (8.3mg/kg) and presented with depression and hypoglycaemia. The animal was treated with dexamethasone and electrolyte supplementation and made a full recovery. The second case, a cocker spaniel, remained asymptomatic after ingesting 250mg.

Clinical effects

The onset and duration of clinical effects are variable and unpredictable. There may be a significant delay (some hours) in the onset of hypoglycaemia – influenced by agent and the animal's insulin status and whether or not food has been ingested recently. Likely effects can be summarised as follows:

- mild – vomiting, abdominal discomfort, dizziness, agitation, tachycardia
- moderate – coma, hypokalaemia, convulsions, hemiparesis
- severe – metabolic acidosis, status epilepticus, cerebral oedema, hypotension, ventricular tachycardia, cardiovascular collapse. Permanent neurological sequelae may occur, usually as a result of delayed recognition and prolonged hypoglycaemia.

Treatment

Dogs or cats on therapy

In dogs or cats on therapy for diabetes in their own right, any amount in excess of the therapeutic dose may result in hypoglycaemia and these cases should be closely monitored.

Dogs or cats not on therapy

Experience of treatment in these cases is limited and, therefore, strict observation is essential irrespective of the amount ingested.

This observation should be undertaken for a minimum of 24 hours post-ingestion – symptomatic individuals after chlorpropamide ingestion may require observation for 72 hours post-ingestion because of the agent's long half-life (Rosendale, 2004).

Monitoring for blood glucose should be frequent (at least hourly) in all cases (**Table 3**) and urea and electrolytes (particularly sodium and potassium). Blood gases should be monitored in symptomatic cases. If the patient develops cardiovascular instability, then pulse, blood pressure and the ECG should be monitored at regular intervals.

Always ensure that adequate hydration is maintained and initiate the administration of intravenous dextrose when hypoglycaemia is detected (**Figure 2**). Glucagon may be required in cases where

dextrose is insufficient to maintain euglycaemia (**Figure 3**).

Sodium bicarbonate should be administered for the treatment of metabolic acidosis (**Figure 4**).

Conclusion

Although the prevalence of diabetes in humans is undoubtedly increasing, the VPIS only sees comparatively few cases of animals poisoned by anti-diabetic drugs.

The general prognosis, if the animal is seen quickly, is good; with severe cases being the exception rather than the norm. The advent of the newer agents will probably further improve prognosis for cases involving acute toxicity. ■

Figure 2. *Guidelines on dextrose administration.*

Dextrose

Prophylactic administration of dextrose is not recommended. The following therapeutic doses of dextrose have been recommended:

- **Maintenance**:
  5% dextrose solution – 40-50ml/kg every 24 hours IV
- **Emergency hypoglycaemic crisis:**
  1ml 50% dextrose solution IV diluted with saline. Consider in any animal presenting with sulphonylurea-induced hypoglycaemia; switch to maintenance dose once euglycaemia is achieved (Papich, 2007)
- **Hypoglycaemia (<60mg/dl [3.3 mmol/L]):**
  50% dextrose at 0.25 to 1.0ml/kg. NB: 50% dextrose is hyperosmolar and should be diluted at least 1:1 with sterile saline/water (Gfeller, 2004).

Figure 3. *Guidelines on glucagon administration.*

Glucagon

In cases where dextrose infusion is insufficient to maintain euglycaemia, a constant-rate infusion of glucagon may be beneficial. However, there is no evidence of an effect in sulphonylurea poisoning and no current indication.

The following doses have been used for management of hyperinsulinaemic – hypoglycaemic crisis in dogs:

- initial constant-rate infusion of 5ng/kg per min (diluted in saline) – doses of up to 13ng/kg have been used for this indication (Fischer, 2000)
- for hypoglycaemic (neuroglycopenic) crises in dogs with 'insulinomas', an initial 50ng/kg bolus IV and then administer at a constant rate infusion of 10-15ng/kg/minute. May need to increase up to 40ng/kg/min.

Figure 4. *Guidelines on sodium bicarbonate administration.*

Sodium bicarbonate

The aim is to maintain the urinary pH at about 7.5-8.0, so doses of sodium bicarbonate recommended are:

With known laboratory analyses

- $\text{bicarbonate required (mmol)} = \frac{\text{base deficit} \times 0.5 \times \text{bodyweight (kg)}}{2}$
- administer slowly over 3-4 hours IV, recheck blood gases and assess the clinical status of the patient.

If blood gases are not available

Bicarbonate required = 0.5-1mmol/kg bodyweight IV slowly over 30 minutes.

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A problem shared

A new system of ensuring that human nurses (RNs) and midwives undertake CPD and reflective activities to maintain their skills is being introduced by the Nursing and Midwifery Council.

Every nurse or midwife renewing their registration with the regulator from 1 April onwards will have to do a number of things – including the provision of five pieces of feedback and five reflective accounts, having a reflective discussion with another registrant, and demonstrating they have done at least 35 hours of CPD in the past three years prior to re-registration.

Commenting on this, Jenni Middleton, editor of the *Nursing Times* (30 December 2015) wrote: 'In many ways, the public perception of nursing is still bedpans and bandages, and this rather antiquated view of nursing still persists . . . No one will articulate how the profession has changed unless nurses do. If nurses are to overthrow their image as 'handmaidens' to doctors or that of *Carry On*-style matrons, nurses must do that themselves.'

This follows closely on the heels of a piece written by June Girvin, RN, and published in the *Guardian* newspaper on 14 September 2015.

'What nurses do and the effect of nursing on patients and experiences of care is increasingly researched and documented,' she writes. 'A starting point of high quality, degree level preparation is now established within the profession, and the importance of continuing education and career-long development is recognised as a necessary response to the complexity of patients' needs and the assurance of patient safety.

'So why does the public conversation around nursing remain so out of kilter with this logical and necessary progression? It's not too far off the mark to say that there is little shift in the public view from the stereotypes of the selfless heroine, the over-sexualised submissive handmaiden or brisk disciplinarian, or the sentimentalised angelic martyr giving her all for little or no reward except a warm glow of satisfaction and a heartfelt "thank you".

'When nurses do examine and articulate their impact, they do so by publishing in academic and scientific journals, by attending professional conferences and by teaching. The general public does not pick up on this positive work, the media take little interest in nursing other than to cry crisis or report poor practice, and the profession itself has made no really serious attempt to engage the public in the rapidly changing role and functions of the modern nurse.

'It is little wonder that images and expectations are stuck somewhere between the 1950s and the 1980s.'

So what relevance does this preamble have to do with readers of *Veterinary Practice Today?*

Well. Nine out of 10 vets polled in the BVA's 'Voice of the Veterinary Survey', felt that more than half of animal owners did not understand what registered veterinary nurses (RVNs) do. If this is true, then it is a significant parallel between the state and status of the human nursing profession and that of RVNs.

The survey also 'revealed the vital role RVNs play in practice life', with vets rating their top two most important functions as monitoring animal patients during anaesthesia (80%) and the medical nursing of in-patients (69%). But how often do vets tell their clients about these roles and, more importantly, make sure that the RVNs receive their share of the credit?

The authors of an article in the *Journal of Advanced Nursing* (26 May 2013) suggested that the professional aspects of the work human nurses perform remain invisible to the media – partly as a result of the dominant position of the medical profession. In other words, it is the doctors who grab the limelight.

One wonders whether this isn't the case in the veterinary sector too? Where is the TV programme about the patience, persistence and technical expertise in a veterinary nurse's life? Certainly the 'right people' in the upper echelons of the veterinary profession are saying the 'right things'; but is there really a concerted effort at practice level to distinguish between RVNs and non-registered vet nurses? Is their empowerment perhaps seen as a threat?

After all, experienced RVNs are invariably very competent at communication with clients – more so than many vets; and their basic venipuncture, dental and manipulative skills are at such a level that they often prove invaluable in the training of newly qualified vets.

Finally, what are pet owners' expectations of what a veterinary nurse should be like? Is it the case – as is well recognised with human nurses – that some do actually prefer the antiquated view of their veterinary nurses as being 'handmaidens' to vets and cuddlers of pets; rather than competent qualified professionals who are perfectly capable of offering sound clinical advice and performing routine surgical tasks in their own right?

There is no simple 'quick fix' solution to these challenges. As has already become evident from Defra's recent response to the recognition of RVN status, no-one outside the profession really cares or is going to impose one.

As with the human nursing scenario defined above by the editor of *Nursing Times*, the answer is very much in the hands of RVNs themselves to educate and inform clients about their role, especially at a practice level; and to work even harder at using the wider media, especially social media, to communicate their professionalism as a necessary adjunct to the more traditional caring component of ensuring the health and well-being of the animals committed to their care. ■

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FLUID THERAPY

Equine intravenous catheters and thrombophlebitis

Intravenous catheters are commonly used in equine practice. However, this can lead to complications such as thrombus and thrombophlebitis. Registered veterinary nurses (RVNs) and nursing assistants should be vigilant when monitoring catheter sites so that complications are prevented. This article identifies effective monitoring techniques and preventive strategies to help minimise the occurrence of intravenous catheter site complications in equine patients.

The use of intravenous catheters has become routine in equine practice owing to the implementation of more intensive medical treatment over recent years (Traub-Dargatz, 1991). Catheter site complications, such as thrombophlebitis, can increase morbidity and recovery time for patients and this is an important concern for RVNs in practice.

In equine patients, it is the jugular vein that is most commonly catheterised (**Figure 1**). This can be limiting in practice – when complications occur in one jugular vein, catheterising the contralateral jugular vein is contraindicated because of concerns over disruption to venous drainage (Traub-Dargatz, 1991). Swelling of the head and cervical region may then lead to a life-threatening airway obstruction (Dolente et al, 2005).

Other intravenous catheter sites used in the horse include the lateral thoracic and cephalic veins, but these sites are more prone to catheter complications (Traub-Dargatz, 1991).

Thrombophlebitis and its causes

Thrombophlebitis is one of the most frequently reported catheter site complications in horses and is recognised as thickening within or around the vein, together with pain, heat and swelling at the catheter site (Geraghty et al, 2009a).

Figure 1. *In equine patients, it is the jugular vein that is most commonly catheterised.*

Intravenous catheters activate the blood clotting cascade in horses, which results in the formation of a fibrin 'sleeve'; and if this reaction is extensive it can result in thrombus formation. Bacteria from the skin may colonise an existing thrombus and this can initiate thrombophlebitis – inflammation of the vein leading to infection (Geraghty et al, 2009b).

How can we prevent thrombophlebitis?

High risk patient identification

The risk of morbidity can be reduced with early detection and treatment of thrombophlebitis (Geraghty et al, 2009a). This is an important concept for RVNs to put into practice when monitoring equine intravenous catheter sites.

Lankveld et al (2001) found that the level of patient debilitation was an important risk factor in the development of thrombophlebitis and Dolente et al (2005) demonstrated that horses with intravenous catheters suffering from a condition that caused a generalised state of hypercoagulation were more likely to develop thrombophlebitis. The conditions identified included endotoxaemia, hypoproteinaemia, salmonellosis and large intestinal disease (Dolente et al, 2005). Geraghty et al (2009a) also found that debilitation and a rectal

temperature above 38.5°C were significant risk factors for developing thrombophlebitis.

The results of these studies suggest that patient risk factors are significant in the development of thrombophlebitis. So identification of high-risk patients – either by recognising a condition that causes abnormal coagulation or a significant clinical parameter, such as heart rate or rectal temperature – could guide veterinary professionals towards the implementation of enhanced intravenous catheter monitoring techniques in order to prevent thrombophlebitis.

Catheter site preparation – clipping

The correct method for preparing catheter sites has been investigated for humans and small animals, but very little research exists for the topic in equine patients (Geraghty et al, 2009b). Inadequate preparation of intravenous catheter insertion sites has been associated with increased rates of infection in cattle, dogs and humans.

There is some debate as to whether the catheter site should be clipped or the hair left in place. Many authors advocate clipping the area of catheter insertion (Traub-Dargatz, 1991), as it is believed that skin disinfectants do not always penetrate down to the underlying skin surface.

Some evidence suggests that clipping dislodges bacteria from hair follicles, increasing the bacterial colony forming units (CFUs) at the site and increasing the risk of infection (Zubrod et al, 2004). Geraghty et al (2009b) found that chlorhexidine was just as effective at disinfecting the intravenous catheter sites of horses when the hair was left long, clipped or shaved.

Geraghty et al (2009b), however, still advocated that catheter sites should be clipped as this improves visualisation of the vein, and reduces the chance of introducing foreign material when inserting a catheter. This is a significant consideration because equine patients live in a particularly contaminated environment. Improving visualisation is also important as repeated venepunctures during the insertion of a catheter can lead to thrombus formation, which may then lead to thrombophlebitis (Lankveld et al, 2001).

Catheter site preparation – correct skin disinfection

There is much debate as to which skin disinfectant is most effective at reducing bacterial counts at proposed intravenous catheter sites. The two most commonly used skin disinfectants in veterinary practice are chlorhexidine and povidone-iodine.

Povidone-iodine is inactivated by organic material and this could be considered undesirable in horses that live in a heavily contaminated environment. Geraghty et al (2009b) found that the use of both chlorhexidine and povidone-iodine scrub solutions resulted in significant reductions in CFU counts on intravenous catheter sites in horses.

However, Geraghty et al (2009b) used chlorhexidine at a concentration of 2% which is less than the 4% concentration recommended by the manufacturers. This could have affected the results as a higher concentration might have enhanced the performance of chlorhexidine compared to povidone-iodine.

Chlorhexidine is believed to have a residual effect lasting up to six hours. This reported residual effect may be of particular use in the preparation of equine intravenous catheter sites giving the contaminated environment in which they live.

Figure 2. *In veterinary medical research, 70 per cent of all intravenous catheter-related infections occurred through the catheter hub itself.*

Osuna et al (1990) discovered that the residual activity of chlorhexidine was decreased by the use of alcohol after the surgical scrub. These authors recommended that chlorhexidine be used for the correct contact time and then rinsed with sterile saline to preserve the residual antimicrobial activity. Further research is required to fully validate these claims because the majority of the literature concerning the preparation of equine intravenous catheter sites advocated the use of alcohol after scrubbing with chlorhexidine or povidone-iodine (Geraghty et al, 2009a).

Osuna et al (1990) also found a significantly increased rate of skin reactions with the use of povidone-iodine, which is undesirable. This would support the use of chlorhexidine for the preparation of intravenous catheter sites in horses, where it is imperative to preserve one single jugular catheter site (Traub-Dargatz, 1991).

Disinfectant hubs

In human research, a disinfecting catheter 'hub' has been used and it reduced sepsis rates by 90 per cent. This represents a dramatic reduction and would be extremely valuable in high-risk equine patients (Sitges-Serra et al, 1997). In veterinary medical research, 70 per cent of all intravenous catheter-related infections occurred through the catheter hub itself. This suggests that hub asepsis could, therefore, be reduced if a disinfecting catheter hub was adopted for use in veterinary practice (**Figure 2**).

In human and veterinary research, it has been suggested that environmental factors and poor management may influence catheter-related sepsis. Improving catheter management during insertion and post-catheterisation will help reduce thrombophlebitis in high-risk patients (Sitges-Serra et al, 1997).

Conducting regular catheter hub cultures, reducing the number of lumens a catheter may have and providing a high level of aseptic handling of catheter hubs will help to minimise sepsis too (Sitges-Serra et al, 1997). Routine catheter hub cultures should be performed, and if positive cultures are found, the catheter should be removed before the vein is affected.

According to Sitges-Serra et al (1997) the hub is the main portal for micro-organisms in human medicine; and by minimising the amount of hub manipulation and improving aseptic technique, sepsis was reduced from one episode every 49 'catheter days', to one episode every 375 'catheter days'. Improving practice

cleaning standards and regular hand washing can reduce the spread of harmful bacteria too.

Performing regular hub cultures is not widely practised in veterinary medicine despite its having been recommended for humans (Sitges-Serra et al, 1997). There has been no research in veterinary medicine that has found it beneficial in equine patients; but it could help with intensive care patients because potentially harmful bacteria could be detected and prevented from colonising the catheter.

Monitoring catheter sites with ultrasound

Ultrasound scanning is a useful tool for the early detection of thrombophlebitis in equine patients with intravenous catheters (Geraghty et al, 2009a). Although it has been suggested that ultrasonographic examination of jugular veins is impractical because of the associated expense and the inconvenience of frequent examinations, these authors found them inexpensive and easy to perform; suggesting that regular ultrasound examinations of intravenous catheter sites would be practical to carry out in equine practice.

In one study, Geraghty et al (2009a) identified subclinical signs of thrombophlebitis in 27 per cent of horses – encouraging evidence for the use of regular ultrasound scanning of intravenous catheter sites to identify early signs of thrombophlebitis and facilitate early preventive treatment.

However, these authors stated that regular ultrasound examinations were only necessary in debilitated patients where the coagulation status may have been compromised. They did not use ultrasound to monitor intravenous catheter sites after the catheters were removed. It has been recommended that ultrasound examinations – carried out after the removal of the catheter – could improve the quality of patient care by monitoring the progress of thrombophlebitis and assessing the response to treatment.

Regular ultrasound examinations of equine intravenous catheter sites could be carried out by RVNs as part of evidence-based nursing practice (**Figure 3**) and reducing the cost of the procedure. The images acquired could then be interpreted by a veterinary surgeon to ensure an accurate diagnosis and facilitate the correct treatment.

Figures 4 and **5** illustrate the differences between a normal and an abnormal IV catheter site scan in the horse.

Intravenous catheter care bundle

Prevention is better than cure. The development of an evidence-based intravenous catheter care 'bundle' for horses could help to reduce the incidence of thrombophlebitis.

The first part of the procedure would be to identify high-risk patients with hypercoagulation disorders. All patients having catheters inserted should have a full TPR examination performed prior to the procedure to aid the identification of debilitated patients.

Next, the catheter site would be prepared by clipping the area and scrubbing the site with 4% chlorhexidine solution for the recommended contact time – as discussed earlier, the concept of rinsing the area with saline rather than alcohol to preserve the residual activity of chlorhexidine warrants further study.

Long-stay catheters made from polyurethane or

Figure 3. *Regular ultrasound examinations of equine intravenous catheter sites could be carried out by RVNs as part of evidence-based nursing practice.*

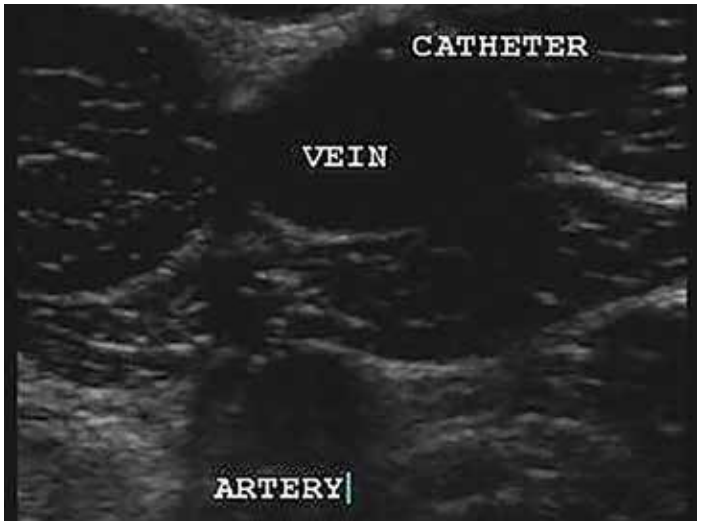

Figure 4. *A normal IV catheter site scan.*

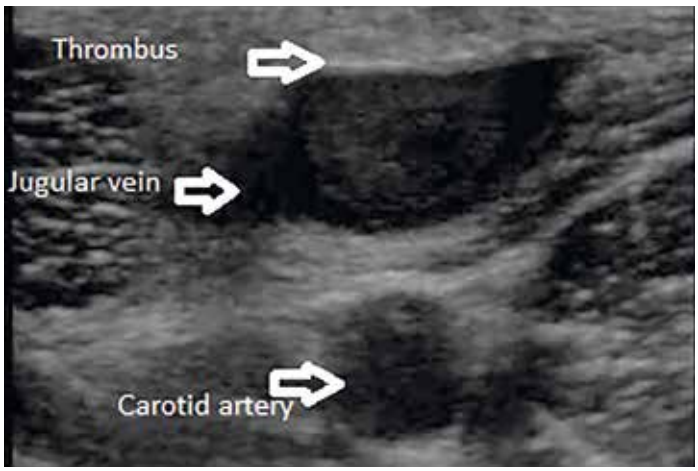

Figure 5. *An abnormal IV catheter site scan.*

silicone would be the most appropriate for use in debilitated patients because they are less thrombogenic than Teflon catheters. Catheters should be flushed regularly to maintain patency and reduce the incidence of phlebitis. Disinfecting catheter hubs should be used in debilitated patients – specifically those suffering from colic – as part of the care bundle: and swabs from catheters and hubs should be cultured to try to prevent complications before they occur.

As part of the care bundle all horses should have the left and right jugular veins assessed via ultrasound before insertion of a catheter. Measurements should be taken and these can be compared to scans taken once the catheter is in place. Debilitated patients should be scanned once daily to monitor for subclinical signs of thrombophlebitis; but in non-high-risk patients this could be performed less frequently, as suggested by Geraghty et al (2009a).

Conclusion

Strict monitoring of catheter sites is essential in equine patients to try to reduce potential complications. The RVN is in an ideal position to do this and to implement preventive strategies.

The application of an equine intravenous catheter care bundle could facilitate evidence-based nursing practice and raise the standards of care for equine patients. This should, however, be implemented with caution because specific studies on the care of intravenous catheter sites in horses are lacking (Geraghty et al, 2009b). Clinical audit could also be used to provide an unbiased means of monitoring protocol changes and to ensure that patient welfare is not compromised. ■

PPD Questions

1. Which vein is usually catheterised in the horse?
2. What strength of chlorhexidine solution should you use to prepare IV catheter site sites the horse?
3. Name three significant risk factors which make an equine patient more prone to developing thrombophlebitis.
4. Which skin disinfectant is believed to have a residual effect lasting up to six hours?
5. Which imaging modality can be used to help detect subclinical signs of thrombophlebitis in equine patients?

Answers

1. jugular vein
2. 4% chlorhexidine solution
3. (i) a disorder causing a state of hypercoagulation (endotoxaemia, hypoproteinaemia, salmonellosis and large intestinal disease); (ii) debilitation; (iii) a temperature over 38.5°C.
4. chlorhexidine
5. ultrasonography

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Emily qualified from Cambridge University in 2012 and began a clinical training scholarship at Synergy Farm Health in association with the Royal Veterinary College, London. She has continued at the practice as an assistant with an interest in sheep health and production, knowledge transfer and developing sheep services in practice.

Biosecurity and the threat of infectious disease to sheep flocks

Biosecurity is one of the current 'buzzwords' for the livestock industry, with the introduction of infectious disease on to stock units posing a significant threat to animal health, welfare and farm profitability. Despite its acknowledged importance, uptake of biosecurity measures is variable. In this article, we will be looking at the challenges of implementing strategies in the UK sheep industry and exploring the role the farm animal clinician can play.

In practical terms, biosecurity refers to the integrity of a unit with regards to (a) preventing introduction of infection from outside the unit (b) preventing the escape of infection from the unit and (c) preventing the spread of infection within the unit.

The sheep industry

Livestock movements play an integral part in the UK stratified sheep industry with the movement of prime breeding stock and draft ewes from hill farms to the lowlands and the movement of 'store' lambs to finishing facilities. The use of markets for the trade of sheep and practices such as the use of common grazing increase the probability of transmission of infection. If suitable controls are not in place, risks can be high.

Costs of disease

Having a thorough understanding of the flock's infrastructure and model is key to emphasising the importance of risks (**Table 1**).

Figure 1. *Identifying boundaries and managing risks here is essential. Boundaries may be insecure or non-existent, for example as common grazing or on public rights of way.*

Attitudes to biosecurity

The potential implications of suboptimal biosecurity status were documented in the 2001 FMDV outbreak; but despite this and the impact on the rural economy, the uptake of biosecurity measures has been relatively poor.

Attitudes to biosecurity vary across the agricultural industry – with farmers perceiving the positive implications of a good biosecurity strategy to be improved profitability and improved health and welfare (Gunn et al, 2008), as well as being associated with professional pride and recognised as important for longer term herd/flock performance.

Table 1. Costs of disease

Disease	Cost	Source
Orf	£3.09 reduction in profit per ewe in a lowland flock with 40% incidence in lambs	Lovatt et al, 2012
Foot rot	£8.38 per ewe in the flock	FAI, 2010
Anthelmintic resistance	Reduced productivity and delay in lamb finishing of 22-28%	Miller et al, 2010
Abortion	£10.90 per ewe	Bennett and Ijpelaar, 2003
Scab	£10.50 per ewe in the flock	Nieuwohf and Bishop, 2005
Liver fluke	£5.60 per lamb in the flock	Eblex Stock Briefing, 2011

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Table 2. Potential pathogens of concern

	Disease/Condition	Clinical signs
Bacteria	Foot rot/scald	Interdigital dermatitis
	Contagious Ovine Digital Dermatitis (CODD)	Severe lameness
	Johne's disease	Wasting in clinical animals, subclinical disease
	Contagious lymphadenitis (CLA)	Abscesses, wasting in clinical animals, subclinical disease
	Enzootic abortion of ewes (EAE)	Abortion
	Campylobacter	Abortion
	Salmonella abortus ovis	Abortion, pyrexia
	Listeria monocytogenes	Neurological disease, abortion
	Coxiella burnetti	Abortion
Viruses	Orf	Scab lesions, typically on nose, tongue and udder
	Maedi visna (MV)	Wasting/neurological disease in clinical animals. Subclinical disease
	Ovine pulmonary adenomatosis (OPA)	Lung tumours. Recurrent pneumonia, sudden death or wasting in clinical animals. Subclinical disease
Parasites	*Psoroptes ovis*	Profound pruritus, fleece loss, weight loss
	Anthelmintic-resistant nematodes, including *Haemonchus*	Loss in performance, anaemia
	Liver fluke/triclabendazole-resistant *Fasciola hepatica*	Loss in performance, loss in performance despite drench use
	Toxoplasma gondii	Abortion, high barren rates
	Lice	Pruritus, fleece loss, weight loss
	TB	Wasting, may be incidental finding
	Tapeworm (*Taenia* spp.)	Incidental finding at PME or neurological disease in form of GID

Negative associations with implementing biosecurity protocols included lack of faith in biosecurity protocols in the absence of wider controls – public footpaths, for example – and national threats to disease status (**Figure 1**).

When sheep veterinary surgeons were asked about biosecurity in sheep flocks, a large proportion did not perceive that biosecurity was within their remit and they viewed that the main obstacle was cost of implementing any suggested strategies.

Farmer demographics also play a key role in attitudes – with younger farmers with larger flocks more likely to engage in eradication programmes. Not surprisingly, perhaps, the extent/severity of disease within a flock also plays a role in farmer perception of the problem – endemic versus epidemic – with the latter more noticeable to farmers (Toma et al, 2013). Organic status also affected positively perception of the need for good biosecurity.

Garforth et al (2013) compared attitudes of sheep and pig farmers to disease risk management in England; finding that pig farmers placed more emphasis than sheep farmers on controls on wildlife, staff and visitor movements and training with regards to health status. Key factors identified included perception of disease risk, cost and attitude towards control strategies, previous experience with control measures, and the credibility of the advice given.

Suggested mechanisms to improve uptake feature improved communication, emphasis on the hidden costs of disease, and the tailoring of advice to individual farmers.

Lessons can be learnt from other, more integrated industries, such as the pig and poultry sectors, although they may require flexibility of application given the structure of the industry.

Hazard analysis and critical control points (HACCP)

As called for in the literature by Garforth et al (2013), an evidence- and risk-based approach is essential for generating an effective protocol for sheep flocks.

HACCP is an infrastructure produced by the National Aeronautics and Space Administration (NASA) – initially to ensure the safety of food stuffs – which has since been adapted to the wider food production industry. The key phases rely on a methodical approach to risk identification, risk reduction, verifying the protocols and review the overall efficacy of the strategy.

To date this has been applied to other farm animal health problems (Bell et al, 2009; Gascoigne and Crilly, 2014). In essence it is a strategic approach to risk identification and management and is an ongoing process as outlined below:

- conduct a hazard analysis
- identify critical control points

- establish critical limits for each critical control point
- establish critical control point monitoring requirements
- establish corrective actions
- establish procedures for ensuring the HACCP system is working as intended
- establish record keeping procedures.

In the context of a sheep flock, the process should be initiated by conducting a hazard analysis – asking the question: "For my flock (or group within my flock) where are the opportunities for introduction/escape of infection(s) and what might those infectious agents be?"

Opportunities for infection

Between farms

'Between-farm' infection transfer can happen as a consequence of the following:

- open flock – buying in infected rams, ewes and/or young stock
- hiring/sharing rams
- showing sheep
- shared grazing, such as common land, sheep on dairy ground
- nose-to-nose contact with adjacent stock (particularly pertinent for sheep scab)
- sharing equipment or resources between farms – including people such as vets, shearers, scanners, working dogs
- sharing transport
- buying in infected feed stuffs (e.g. *Listeria monocytogenes, Toxoplasma gondii*)
- water-borne/aerosolised transmission (e.g. *Coxiella burnetti*).

Spread within farm

This can happen as a result of:

- co-grazing of infected and non-infected animals (e.g. foot rot, CODD, scald, OPA, CLA)
- colostral transfer of pathogens (e.g. Johne's disease, Maedi visna)
- transfer at routine handlings (e.g. lice, CLA, infectious lameness)
- housing in infected buildings (e.g. orf)
- delayed carcass disposal
- contaminated feed (e.g. soil/cat faeces)
- dung disposal from isolation areas on pastures
- transfer on equipment (e.g. infectious lameness, CLA/scab on shearing equipment) (**Figure 2**)
- failure to worm a scavenging farm dog.

Potential pathogens of concern

These are summarised in **Table 2**.

The veterinary surgeon is perfectly placed to conduct a risk analysis as he or she will have a comprehensive understanding of the disease status of the flocks in their care and an overview of the local or national prevalence of disease (**Figure 3** and **Table 3**).

***Figure 2**. Equipment can potentially play a role in disease transmission. A recent study found foot-trimming equipment was PCR-positive for infectious lameness agents, even after disinfection. (Sullivan et al, 2014)*

Demonstrating disease status on farm may be helpful at this

Table 3. Risk analysis

HIGHER RISK	MEDIUM RISK	LOWER RISK
Buying in animals from mixed sources	Buying in animals direct from single producer, testing and isolating on arrival in designated facility	Closed flock
Shared grazing/nose-to-nose contact	3-metre boundary fences	
Sharing equipment	Sharing equipment but disinfecting between animals/premises, e.g. trimmers, shearers	No shared equipment
Routine gathering of sheep spreading infections, such as foot rot		Reduced routine catch up, e.g. no routine foot trimming, targeted drenching of sheep
Sharing rams	Buying own rams and checking disease status whilst in quarantine	Breeding your own rams/ET importation of genetics
Delayed carcass disposal		Prompt disposal of carcass
No quarantine of incoming animals		28-day quarantine in specific quarantine facility
Contaminated feed, e.g. soil/cat faeces		Covered forage/feed stores. Feed from known source
Dung disposal from isolation areas on pastures where sheep graze		Do not graze isolation paddock for 28 days after used
Leaving affected animals with main flock, e.g. lameness, Johne's, Maedi visna		Isolate infected/suspected animals
Attend show and sales without using isolation facility when returning	Attend show and sales using isolation facility when returning	Not using shows/sales
Unlimited access to the farm		Limited access to essential visitors
No clothing or equipment controls at farm boundaries	Disinfection of clothing or equipment at boundaries	Farm provides own clothing at boundary

Figure 3. *Managing and reducing the risks from infectious disease is essential to managing a healthy flock.*

Figure 4. *Screening cull ewes for evidence of infectious disease can be helpful to establishing disease status on farm. (Photo: Kat Bazeley)*

stage – if you know the flock is free from Maedi visna, it may facilitate emphasising the importance of screening infected animals/buying from high health flocks.

Once the hazard analysis has been performed, critical control points can be applied to this model as areas of potential pathogen introduction/movement where there are opportunities for control, and at this stage we can define our controls.

Our aim is to reduce the relative risk as far as is practical/financially possible. So, for instance, closing the flock may not be practical or cost effective for 'flying flocks', whereas introducing a quarantine protocol may be. Risk elimination may also not be possible.

We must then define the critical limits for our risk. In the food production industry, these are typically quantitative values which if exceeded, trigger a control mechanism. With our biosecurity application, ultimately we are looking for a quantitative target – protecting our flock from introduction/spread of disease and continued absence of diseases.

Monitoring our control point should be an ongoing process. The farmer plays a key role in monitoring his or her flock for evidence of disease; and, as veterinary surgeons, our involvement will vary depending on the relative threats to a flock – increases in lameness, new lesions when examining feet and evidence of sheep scab, for instance. There is invariably a key place for the veterinary surgeon in the screening process.

Measuring and monitoring the proportion of lame animals at flock health planning, performing cull ewe screens (**Figure 4**) to examine for evidence of endemic diseases, such as CLA and MV, and screening home-bred lambs for evidence of positive sheep scab antibody titres, can be used to evaluate efficacy of controls.

The flock health plan is ideally placed to define preventive and corrective actions should evidence of a breakdown occur. This may be recommending isolation of any suspect animals presenting as lame, calling for veterinary assistance if levels of lameness exceed a targeted threshold or defining the actions to be taken if an animal is positive on serology on quarantine testing.

Finally, the flock health plan/annual screening is an ideal time to review the above strategy and ensure that protocols are working. It provides valuable information for flocks selling to other premises, fulfilling stages 6 and 7 of the HACCP analysis.

Sourcing and quarantine

When sourcing animals, those with the highest health status should be sought. Maedi visna-/EAE-accredited free animals are available but largely confined to pedigree flocks or terminal sire breeds. Flocks can screen for evidence of the chronic diseases – Johne's, CLA and MV on serology or pooled faecal PCR (Johne's).

Obtaining and interpreting information is a challenging exercise, especially when buying from dealers or through markets; so, where possible, animals should be bought direct from the breeders.

Purchased animals should be placed in quarantine prior to introduction into the main flock. They should be quarantined for as long as possible and the opportunity used to establish them on similar preventive medicine protocols to the main flock, including vaccination and parasite control protocols. Ideally, newly purchased or returning sheep would be placed in isolation for 28 days prior to arrival with the first 48 hours spent on concrete.

Incoming animals should be drenched with a 'new derivative' drench ('orange' or 'purple' drench) to 'knock out' nematodes resistant to the original three classes of anthelmintics. This should be accompanied with scab treatments – dips or injectable macrocylic lactones (MLs). Be aware that different active ingredients may require different protocols. So, for instance, long-acting moxidectin (2%) only requires a single treatment at introduction in comparison with ivermectin injections requiring two doses given seven to 10 days apart (owing to the ability of sheep scab to survive off the sheep for 17 days). Note that MLs will not deal with lice infestations.

Given the documented cases of triclabendazole-resistant *Fasciola hepatica*, treatment with an alternative flukicide may be warranted depending on the origin of the sheep. Closantel is capable of achieving up to a 90 per cent kill in fluke seven weeks old and, therefore, any quarantine protocols where resistance is suspected should involve isolation for seven weeks followed by re-treatment.

Whilst in isolation, animals can be screened on serology for infectious diseases such as MV, CLA, Johne's (or

faecal PCR), Border disease and toxoplasmosis/EAE. Where toxoplasmosis is endemic, emphasis should be placed on prophylactic vaccination and, given the behaviour of EAE serological titres – low until around time of abortion – greater importance should be placed on sourcing from accredited flocks or vaccination of all replacements in the flock.

Animals found to be positive for MV, CLA, Johne's or Border disease antigen should remain in isolation and are not candidates to enter the flock. Any cohorts also in isolation may need to be considered for re-bleeding.

Suggestions for monitoring and verification

Knowing the status of a flock with regards to infectious diseases and monitoring its ongoing status is imperative in order to validate the efficacy of concurrent controls and may be pertinent when selling stock – "Has your flock evidence of the presence/absence of disease?"

So:

- what is the current level of lameness on the farm? How has it changed? What (if any) new lesions have been identified in the last 12 months?
- ideally the level of lameness should be <5% and, hopefully, decreasing. We should aspire to there being no new lesions and that CODD continues to be absent/reducing in the flock
- what diseases are on farm and has this profile changed/increased?
- in this respect, cull ewe screens are an ideal opportunity to test for the presence of CLA, MV and Johne's disease
- which anthelmintics/flukicides work on the farm? Is this changing based on faecal egg count reduction testing, or coproantigen reduction testing for fluke?
- is there evidence of exposure to sheep scab – clinical disease or positive serology in lambs?
- has the level of barren ewes/abortion changed (target <5% and 2% respectively)? If yes, consider a barren ewe check?

If there is any evidence of disease breakdown, the risk analysis may need to be reviewed.

Conclusion

Infectious disease is threatening to the health, welfare and productivity of sheep production; yet, despite this fact and notable cases such as the 2001 FMDV outbreak, attitudes of sheep farmers and their veterinary surgeons vary as to biosecurity and its importance. A tailored, risk- and evidence-based approach should be employed in all flocks and the strategies should be practical and achievable.

Establishing disease status and implementing ongoing monitoring protocols are crucial to any risk-based strategy and are pivotal to the ongoing productivity of flocks. The sheep veterinary surgeon is in a position to oversee broad strategies on farm, and to offer and interpret monitoring and verification of progress. ■

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PPD Questions

1. What are the alternatives to sharing rams that would reduce the risk of introducing infection?
2. What samples can be taken to screen for Johne's disease in sheep flocks?
3. What pharmaceutical treatments would you recommend for quarantined animals?

Answers

1. Quarantine rams (purchased or shared) before use and take samples to check disease status; buy in rams with known health status, direct from breeders; bring in embryos
2. Serology; faecal PCR/culture; impression smear at post-mortem on small intestine of suspect animals
3. New derivative anthelmintic (e.g. orange or purple drench); scab treatment (e.g. dip/macrocyclic lactone); fluke treatment (e.g. closantel if possibility of TBZ resistance)

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PATHOLOGY

How to . . . investigate sudden death

The investigation of sudden death in farm animals is a relatively common request for large animal vets. If multiple deaths have occurred, or valuable livestock are involved, there can be pressure from the client to come up with a diagnosis and provide a solution very quickly. It is important to take a logical approach to investigation, otherwise key pieces of information may be missed.

Sudden death could be defined as the 'sudden and unexpected death of an apparently healthy animal', but as some management systems are quite extensive and levels of stockmanship vary, not all cases will meet this definition. An animal may have shown clinical signs for several hours before it died, but these may have been missed if stock were only inspected once every 24 hours.

Alternatively, an individual may have been separated from the rest of the group and not been seen for two or three days before being found dead; or vague clinical signs may not have been noticed by the farmer before death.

As many sudden death cases will involve insurance claims or litigation, detailed records should be kept from the first point of contact. It is a good idea to establish whether litigation is a possibility, because this may influence how far investigations should go to confirm the diagnosis.

Causes

The causes of sudden death can be categorised and having these broad categories in mind may aid investigation. The areas that should be considered are trauma/accident, feed-related deaths, infectious disease (bacterial, viral and parasitic) and access to toxins. Some common examples of these are given in **Table 1**.

Initial approach

There are many possible causes of sudden death and no possibility should be dismissed; for the saying "common things are common" does hold true in many cases. The first – and most crucial – part of the investigation is to take a good history. Knowing the species, age and management system will enable a shortlist of possible causes to be drawn up.

Although farmers may be unwilling to spend time giving a history, clues to the likely cause can become apparent during detailed questioning, which will help the next stage of the investigation. A detailed history will include the following categories.

Age, breed and sex

Are all the dead animals the same age? If animals of all ages are affected, the cause has to be something that is not age-related. This can rule out causes such as nematodirosis in sheep or acute mastitis. If there is a breed or sex bias, some conditions are raised as possibilities – urolithiasis, for instance, or those linked to pregnancy.

Clinical signs

When were the animals last seen alive and were any clinical signs such as respiratory distress or opisthotonos observed?

Groups

Were all the affected animals in the same group, shed or airspace?

Time-frame

How long had the dead animals been on the farm or in the group? Could it be a disease, such as acute pasteurellosis, caused by the stress of moving; or something they were exposed to after coming into the herd or at market – IBR, for example? (**Figure 1**).

Bought in

Are only bought-in animals affected? Had they received vaccinations against clostridial diseases or pneumonia? Had they been given the routine herd/flock vaccinations since arrival?

Reproductive status

Were the animals pregnant or had they recently given birth?

Table 1. Causes of sudden death by category

Category	Examples
Traumatic or accidental	Injury from RTA or fighting, lightning, stray electricity, dosing gun
Feed related	Acidosis, bloat, hypomagnesaemia, White muscle disease
Infectious (bacterial, viral or parasitic)	Anthrax, acute pneumonia, clostridial disease, fluke
Toxins	Lead, plants, nitrates, rat poison, acorns

Figure 1. *Severe tracheitis in a cow with IBR.*

Figure 2. *Pieris is a common ornamental shrub which is toxic to ruminants.*

Figure 3. *Rapid autolysis in a cow which died from Blackleg.*

The stage of pregnancy or lactation is important, because metabolic diseases, such as milk fever, are much more likely in late pregnancy or early lactation, whereas acute toxic conditions, such as mastitis and metritis, are more common in the periparturient period.

Housing

Have there been any recent changes or building work? If building work has taken place there may be increased risk of access to lead from old putty or paint, or to stray electricity from unfinished or poorly finished work. Poor ventilation increases the risk of acute pneumonia.

Pasture

Have animals safely grazed the pasture in past years? Are there any toxic plants, such as yew, hemlock or oak, nearby? Are there any streams and has there been any dredging which might have exposed hemlock tubers or anthrax spores? Has there been any access to recently fertilized land which may increase the risk of nitrate poisoning? Has anybody tipped garden trimmings or car batteries over the hedge? Cases of plant or lead poisoning have been caused by all such activities.

The type of pasture can be important too – clover-rich leys increase the risk of ruminal bloat; stock on very restricted grazing are more likely to eat toxic plants, such as bracken; and moving cattle on to fresh grass in the autumn increases the risk of Fog Fever.

Feeding

What are the livestock being fed, by which route, and have there been any recent changes? Certain diseases are linked to the type of feed – for example, acidosis is a common cause of sudden death in lambs soon after concentrate feed has been introduced. Has there been a new batch or type of feed which could be contaminated with bacteria or toxins – silage containing *Listeria monocytogenes*, for example, or toxic plants such as bracken.

Minerals

Which minerals have been fed, by which route, and have there been any changes? Do all stock have access? Has it run out over the last two days? Hypomagnesaemia is a common cause of sudden death in cattle or sheep and cases can occur even when supplementation is provided, especially if intake is optional.

What is the selenium status of the farm? Sudden deaths just after turnout in young calves and lambs could be the consequence of nutritional myopathy.

Water

Have there been any interruptions to the water supply and do all stock know how to find it? Cases of salt poisoning have occurred after housing in unfamiliar sheds, when stock have failed to find the water supply.

Access

Have any animals escaped and gained access to a feed or chemical store, or gardens where there may be toxic shrubs, such as rhododendron or *Pieris* (**Figure 2**).

Handling

Have the stock been drenched or dipped recently? Was an experienced operator involved? Blackleg has been reported after handling when dormant spores have been reactivated after bruising during handling.

Vaccinations

Which vaccines are used and when are they given? Do stock receive a proper course and annual boosters? Clostridial diseases are amongst the most common causes of sudden death in ruminants. Although many flocks are vaccinated, on further questioning it may become apparent that the primary course has never been completed so, in effect, they are not protected.

Handling of vaccines – refrigeration, speed of use after broaching vial – is another area which is worth probing, as mishandling of these products is commonplace.

Parasite control

Which treatments have the stock received and when? Was the correct product used at the right time of year? Using a flukicide that treats only adult fluke infection can lead to deaths from acute fluke at the high risk time of year. Was the correct dose given, and are there likely to be resistance problems if products containing benzimidazoles or triclabendazole were used?

Weather

Bad weather can increase the risk of some diseases, such as hypomagnesaemia; or damage fencing which can allow access to areas where there may be feed stores or toxic products. In cases of lightning strike, it helps to see the animals in situ – under trees, metal fencing or water troughs – and to confirm with the Meteorological Office as to whether lightning was recorded in the area at the estimated time of death.

Freezing weather and access to frozen forage is linked to the clostridial disease, Braxy, in sheep.

Farm history

Any recent disease in the livestock or changes to the management system

Table 2. Items required for post-mortem examination

Items required
■ protective clothing
■ gloves (vinyl + cut-proof)
■ sharp knife or heavy duty scalpel
■ scalpel handle and blades
■ saw
■ sample pots of various sizes
■ vacutainers + needles
■ 16 gauge needle + syringe
■ dipsticks for glucose
■ pH meter
■ 10% formol saline
■ camera
■ notepaper + pen
■ disinfectant.

or personnel may be of importance. The timescale of the losses is another useful line of enquiry. If similar deaths have occurred in previous years under similar circumstances, then recent changes on the farm may not be significant. It is important to keep an open mind.

Anthrax is a notifiable disease in the UK, so if the sudden deaths involve cattle, then the local APHA office should be consulted to ask for authorisation for an anthrax inquiry. It will require a detailed history, including ear tag number, feeding management and calving history, before a decision is made. If the authorisation is given, the carcass cannot be moved until a negative result is confirmed after examination of a blood smear. If the history has raised any suspicions of any other notifiable disease these should be discussed with APHA before taking any further action.

On arrival on farm

Look at the other stock in the group for signs of ill health. Are there any poisons around? Is there any possible access to feed, lead, chemicals, electricity, toxic plants, pest control substances? If possible, look at the site where the animals were found, particularly if lightning strike was one of the possibilities.

Post-mortem examination

Ideally, thorough post-mortem examinations should be carried out in a veterinary laboratory; but often this is not possible for a variety of reasons, such as distance, transport and time of day, and on-farm post-mortems can provide very useful information and a diagnosis.

In cases of multiple deaths, several carcasses should be examined to check that there is a consistent cause. Choose the freshest ones available, although examination of autolysed carcasses is worthwhile if they are the only option, as sometimes a diagnosis can be reached – haemorrhage caused by

Table 3. Basis of post-mortem examination in sudden death cases

Area of carcass	Items to check
External examination	ID, mucous membranes, wounds, udder Body condition, discharges
Subcutaneous tissues	Degree of hydration, congestion, colour Peripheral lymph nodes
Head and neck	Oral and nasal cavities Pharynx, oesophagus, trachea, brain
Thoracic cavity	Lungs, pericardium, heart, lymph nodes
Abdominal cavity	Liver, kidney, spleen, bladder, lymph nodes, GIT including contents at all levels Urogenital tract
Musculoskeletal system	Joints, muscles (including diaphragm, tongue, intercostals, masseters, heart)

Table 4. Some common causes of sudden death, samples to collect and useful tests

Suspected diagnosis	Sample	Test(s) required
Septicaemia	Fresh liver, lung, spleen, lymph node	Anthrax smear (before PME) Bacterial culture
Clostridial enterotoxaemia	Distal ileal content (5ml) Urine Brain	Clostridial toxins Glucose in urine for pulpy kidney disease Histology
Clostridial myositis	Dark dry lesions in muscle	IFAT or anaerobic culture Histology
White muscle disease	Pale, mineralised muscle Liver	Myocardium +/- skeletal muscle for histology Liver selenium level
Acidosis	Rumen content	pH <4 or 5 (rises with time)
Chemical toxins (e.g. lead poisoning	Liver/kidney	Fresh liver and kidney for biochemical analysis
Hypomagnesaemia or hypocalcaemia	Aqueous or vitreous humour	Calcium and magnesium levels
Pneumonia	Lung +/- trachea	Culture/PCR/histology
Parasitic gastroenteritis	Abomasal and intestinal contents Faeces	Worm count Worm egg count

trauma, for instance, or acute fluke infection.

If the animals are to be collected by a 'fallen stock' company, check that the firm is happy for the animal to be completely dissected. Usually this is not a problem as long as the viscera can be 'bagged' for easy removal.

If a list of possible differential diagnoses has been drawn up after taking the history, it can be useful to contact the veterinary laboratory to ascertain the best samples to take to confirm the diagnosis. Equipment for taking these should be readily to hand whilst the post-mortem is carried out (**Table 2**).

The examination should be carried out in good light if at all possible, contemporaneous notes should be made and photographs taken of significant findings. It is good idea to get into the habit of doing a systematic post-mortem so that nothing is missed (**Table 3**) and a check list of the body systems will ensure all areas are examined.

The examination should start with an external examination. The ear tag number should be recorded and the condition of the animal. Any external injuries should be noted. If there are any wounds, the presence of adjacent haemorrhage and swelling will denote whether the injury took place ante- or post-mortem. The eyes and mucous membranes should be checked for signs of congestion, haemorrhage or dehydration. Note the degree of autolysis too – rapid autolysis is more likely in some causes of sudden death, such as clostridial disease and lightning strike (**Figure 3**).

A sample of aqueous or vitreous humour can be taken for biochemical analysis for calcium, magnesium or urea levels (Edwards et al, 2009). It is beyond the scope of this article to describe in detail a full post-mortem examination – other texts should be consulted for further information (Otter and Davies, 2015).

Figure 4. *Internal haemorrhage caused by trauma resulted in the death of this young calf.*

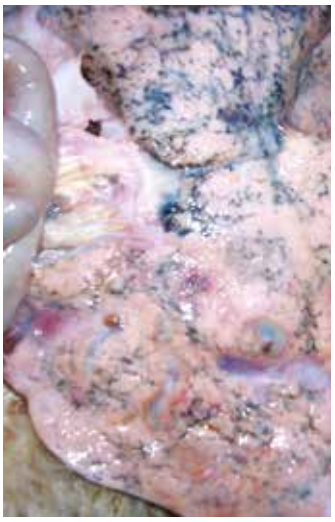

Figure 5. *Acute fascioliasis.*

Gross post-mortem findings can be conclusive in certain types of sudden death (**Figures 4** and **5**); in other cases samples are required to confirm the diagnosis (**Table 4**).

Sampling in-contact animals

In cases of suspected nutritional deficiency, samples taken from in-contact animals can sometimes be the fastest way to reach a diagnosis, especially if in-house biochemistry is available. This approach may be useful in cases of hypomagnesaemia, hypocalcaemia, acorn poisoning or nutritional myopathy. However, care must be taken to ensure that the stress of handling does not precipitate more deaths.

Although the task may seem daunting, a logical approach to investigating sudden deaths will lead to a diagnosis in most cases. The history will often give rise to a suspicion of the cause and post-mortem findings and diagnostic tests can confirm this. Preventive actions should be taken, if possible, while awaiting laboratory results – by removing stock from access to suspect pasture or feed, or providing mineral supplementation, for example. ■

PPD Questions

1. What is the definition of sudden death?
2. List the categories of causes of sudden death used in this article.
3. Name two causes of sudden death which may cause rapid autolysis.
4. Which samples should be taken at post-mortem to test for lead poisoning?

Answers

1. The sudden and unexpected death of an apparently healthy animal
2. Trauma/accident, feed-related, infectious, toxin-related
3. Clostridial disease and lightning strike
4. Fresh liver and kidney for biochemical tissue analysis

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Food for thought

Every year Defra publishes a little book called the *Food Statistics Pocketbook*. It makes fascinating reading.

Based on the farm-gate value of unprocessed food, 22 countries accounted for 90 per cent of the UK food supply in 2014. However, the UK supplied over half (54%) of this, with the leading foreign suppliers being the Netherlands (5.6%), Spain (5.1%), France (3.1%), Germany (3.1%) and Irish Republic (3.0%).

Three countries accounted for 90 per cent of dairy product and egg supply (UK supplied 86%); and three countries accounted for 90 per cent of meat and 'meat preparation' supply (UK supplied 84%). Twelve countries accounted for 90 per cent of the supply of cereals and cereal preparations, including rice (UK supplied only 56%); while 24 countries accounted for 90 per cent of our fruit and vegetable supply (UK supplied just 23%).

Following a voluntary initiative by Food and Drink Federation members, fresh meat, poultry and fish now carry details of origin, highlighting a British provenance when applicable. Referencing British origin with the Little Red Tractor or a Union Jack is clearly worth doing because, according to a Consumers' Food Safety Concerns Report (May 2015), 38 per cent of people say only using British ingredients encourages their trust in a product. This falls to only eight per cent for 'European ingredients'.

Price still primary driver

There are now generations who have grown up with the concept of cheap food, which item now only constitutes an average 11 per cent of household expenditure, as opposed to the expectation in the 1950s and early 60s of spending up to a third of household income on food.

Food is the largest item of household expenditure for low income households after housing, fuel and power costs and food price rises have a strong effect on their food shopping habits. Since 2007, households in income decile 1 (lowest income group) bought less beef, bacon, butter, fish, fruit, tea and biscuits/cakes, but bought more pork, poultry and eggs.

According to the IGD ShopperVista survey (2014), price is increasingly important in driving product choice, with 36 per cent of shoppers naming it as the most important factor and 90 per cent listing it within their top five influences. Quality was rated as the highest influence by 18 per cent of respondents, followed by taste or smell (13%) and healthy eating (10%).

'Use by' dates were considered most important by only five per cent of shoppers; although half (51%) included it in their top five influences. 'Familiarity' and 'brand names' still have a sway in many purchase decisions, with 47 per cent and 35 per cent of shoppers naming them respectively in their top five influences.

Ethically produced products and whether a product was easy to use were considered least important factors, with only 18 per cent of shoppers listing them in their top five influences.

Shameful waste

The average UK household spend on food that could have been eaten but is thrown away is around £470 a year. A survey into food waste (WRAP, 2012), found that 4.2 million tonnes of avoidable food waste was disposed of by UK households – equivalent to 12 per cent by weight of that brought into the home. Forty eight per cent was not used in time, 32 per cent was wasted because too much had been cooked or served, and 14 per cent was down to 'personal preference'.

Over half of 'meal leavers' eating out linked leaving food to various aspects of portion sizes. Two fifths (41%) stated that one of the reasons why they had left food was because the portion size was too big and 11 per cent stated that they ordered/served themselves too much.

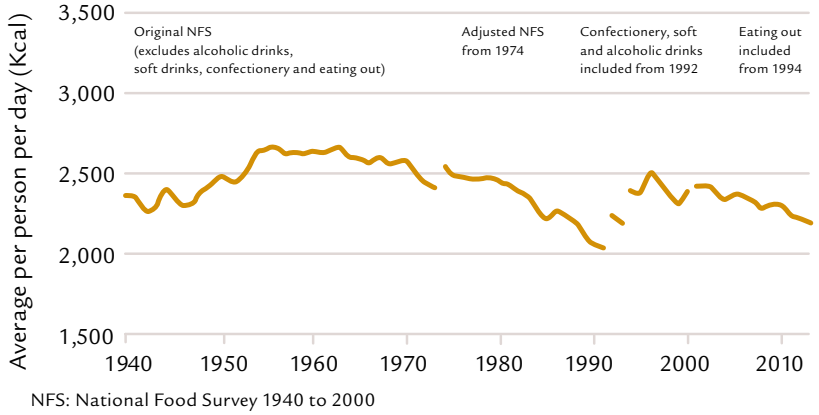
Too many calories

Health problems associated with being overweight or obese are estimated to cost the NHS around £5bn per year. Obesity is associated with cardiovascular risk and with cancer, disability during old age, decreased life expectancy and serious chronic conditions such as Type 2 diabetes, osteoarthritis and hypertension.

In 2013, 25 per cent of adults were obese and a further 37 per cent were overweight; this despite a long-term downward trend in energy intake since the early 60s (**Figure 1**). Combining year-on-year changes of estimates on like bases suggests that the average energy intake per person is 31 per cent lower in 2013 than in 1974.

This all points to the fact that, despite decreasing energy intake, *over-consumption of energy relative to our needs* is still a major factor in our increasing levels of obesity. And the inescapable conclusion that we should simply eat less, consume smaller portions and take more exercise. ■

Figure 1. *Trends in average energy intake from food and drink 2013.*



NFS: National Food Survey 1940 to 2000
EFS: Expenditure and Food Survey from 2001-02 (now known as Living Costs & Food Survey)

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About a bee

The first of a two-part series on the natural history and management of bees.

Bees evolved from wasps about 100 million years ago, around the mid-Cretaceous period, when angiosperm (flowering) plants were becoming the dominant form of vegetation. Bees forming colonies appeared over 32 million years ago and were a major evolutionary development.

Whilst the individual bee is its own biological entity, the colony takes this development further with its own characteristics in terms of social organisation, reproduction, homeostasis, and is often termed a super-organism.

Workers, queens and drones have a set life span and are dependent on the other bees for survival; but the colony itself is perennial, assuming there is no overwhelming disease.

There are approximately 20,000 different species of bee in the world; however, there is only a small group of nine species of social bees. The most famous is the European honeybee, *Apis mellifera*, though this now has a worldwide distribution mainly through the beekeeping industry. These bees belong to the phylum Arthropoda, the class Insecta, the order Hymenoptera, the super-family Apoidea and the family Apidea.

The social organisation of honeybee colonies can also be termed as eusocial and is generally agreed to fulfil four criteria:

- the adults live in a nest
- there is a clear division of labour between sexual castes of queens and drones and the sterile caste of workers
- there is an overlap of adult generations
- adults (the workers) share the rearing of the brood, such as the larvae.

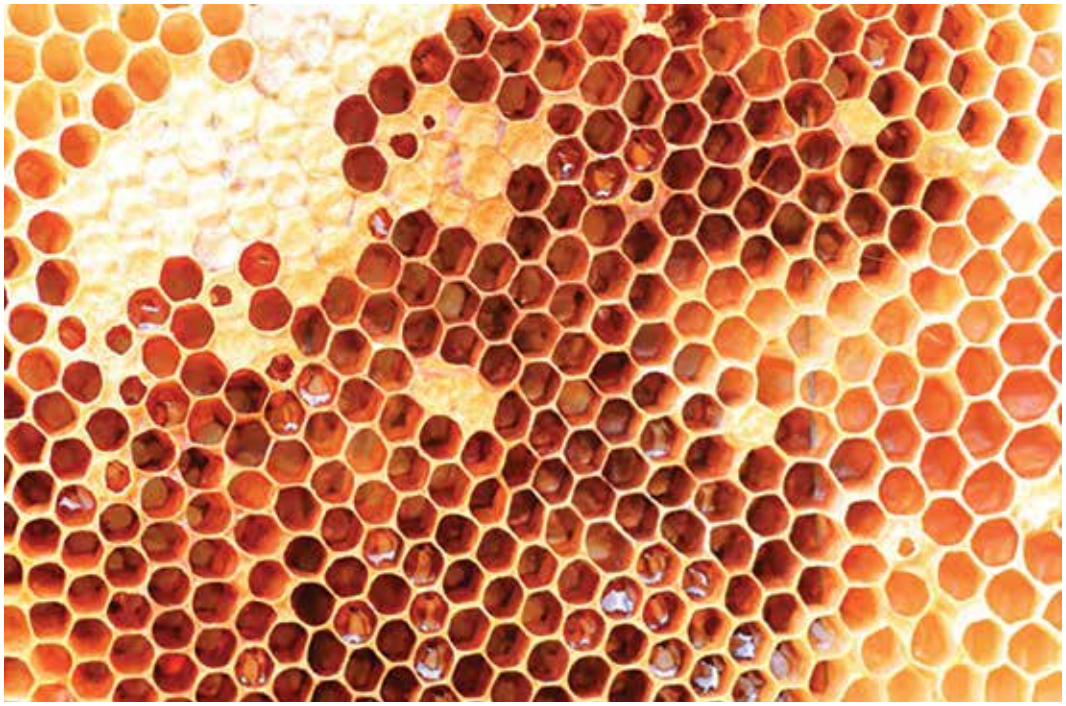
The honeybee is an insect with a head, thorax and abdomen, three pairs of legs and two pairs of wings. The mandibles are used to manipulate wax to form the hexagonal cells of the honeycomb (**Figure 1**). The wax is produced by four pairs of glands on the lower abdomen by workers over 12 days old. There are three castes of bee in a colony – the workers, the drones and the queen.

The queen

The queen is the reproductive centre of the colony (**Figure 2**). There is usually only one queen present and she is the mother of all the workers and drones in the colony. She is about 20mm long with a much longer abdomen than workers, smaller eyes than workers, no pollen-collecting structures on her hind legs, a shorter proboscis and no wax glands.

Her main role is to lay eggs in the wax cells on the comb. The

Figure 1. *Bees manipulate wax to form the hexagonal cells of the honeycomb.*



**Suggested Personal & Professional Development (PPD)*

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BEES

Figure 2. *A queen bee (marked) surrounded by worker bees.*

rate of egg laying peaks around late May to early June at a rate of 2,000 eggs per day – hence the reason why she is known as an 'egg-laying machine'. The weight of eggs laid per day is greater than her bodyweight and is achieved by constant feeding and care from a retinue of workers that accompany her round the comb.

The queen's reproductive system comprises two large ovaries, each having 150-180 ovarioles all producing eggs in a production line. The eggs pass down through the oviducts into the vagina and are laid in the wax comb cells. The sperm store (or spermathecae) open into the vagina via a valve fold. As the egg passes by, sperm are deposited on the end of the egg – or micropyle, if the egg is destined to become a worker or new queen.

Drone eggs are not fertilised. The spermathecae are a life-time store for approximately seven million spermatozoa. In fact, only about 12 to 15 sperm are deposited on the egg as it passes by the spermathecae valve fold. How this is achieved is not understood. Over the course of one year, she will lay about 200,000 eggs and be fertile for up to five years – though it is rare for her to survive this length of time. Two to three years would be more normal.

The queen has a smooth stinger which she uses to kill rival virgin queens shortly after their emergence. Her mandibular glands secrete a pheromone that inhibits the uterine development in the workers. This is known as 'queen substance' – a somewhat old-fashioned term.

The drone

The drone is a male bee and appears in the colony from April to September. There are approximately 500 at peak population. They are 19mm long and of stocky build with very well-developed flight muscles and large eyes. They have small mandibles, no pollen carriers on their hind legs and no stinger. They arise from an unfertilised egg by a process known as parthenogenesis and are, therefore, haploid in having only half the number of chromosomes.

Drones do no work around the colony. Their prime function is to mate with the queens – known as 'the flying gamete' – and their large thoracic wing muscles allow them to fly quickly, although very few drones achieve their sexual ambition. Their reproductive apparatus is adapted for mating with queens in flight at about 40 to 48 kilometres per hour.

Most drones will return to their own colony. Some, however, will go to other hives and be accepted by guard bees in another colony. This process is known as 'drifting' and has implications in disease spread. All drones are expelled from their colonies in September to die.

The worker

Workers make up the largest percentage of colony members with approximately 55,000 to 60,000 in a British National hive; whereas the Langstroth hive can have up to 70,000 individuals. Workers arise from fertilised eggs, are all female and are diploid with 16 pairs of chromosomes. Their overall length is 15mm so they are smaller than drones and queens. They are sterile as they do not mate and their uteri do not develop in the presence of a queen.

Workers have well-developed mandibles for manipulating food and wax and highly modified mouthparts, forming a proboscis for sucking in nectar from flowers. Much of the communication within a colony is achieved through the process of food transference between individuals, known as trophylaxis.

"There is usually only one queen present and she is the mother of all the workers and drones in the colony"

"Whilst the individual bee is its own biological entity, the colony takes this development further with its own characteristics in terms of social organisation"

They have well-developed eyes and an array of sensory organs on their antennae which detect vibration, volatile substances, air movement, temperature, humidity and so on. In fact, there are 30,000 sensory organs on each antenna and they take 20 per cent of the circulating haemolymph (bee blood) to supply them. There are two large compound eyes and three more primitive ones on top of the head known as ocelli.

The compound eyes are composed of 5,000 to 5,500 separate units with cornea, lenses, photoreceptive cells and optic nerve connection – each known as an ommatidium. It must be remembered that all the work carried out in the hive is done in almost complete darkness, but the eyes come into their own when the bees are out foraging.

There are two pairs of wings which can connect with hooks called hamuli for flight. The wings beat at 200 cycles per second and bees travel at an average speed of 24km/hr. The abdomen contains a special sac called the 'honey crop' situated between the distal end of the oesophagus and the stomach or ventriculus. This is used to hold nectar for transportation back to the hive and invertase enzyme is added to begin the process of converting nectar sucrose to fructose and glucose.

The sting is a modified ovipositor used in defence and consists of a stylus and two sharp pointed lancets. These barbed structures are connected to a venom gland. Workers live for about six weeks in summer and up to six months in winter.

Figure 3. *A worker bee emerging from a cell.*

Brood development

The formation of workers, queens and drones takes place inside the wax comb cells. There are four stages – egg, larva, pupa and adult. The queen lays the egg vertically in the middle of the floor in the cell. It appears vertical as viewed from above but in reality it is in a horizontal plane. Over the next three days, the egg goes flat on the floor of the cell, nestling in a small pool of 'royal jelly' – a particularly nutritious food produced by the workers.

After three days, the fertilised worker egg hatches into a pearl-white larva and initially sits in a small pool of food. It is attended to by worker 'nurse' bees that constantly feed and nurse. Growth is rapid as a small 'c' shape and stretches out and fills most of the cell, until the workers cap the cell with a membrane of wax on Day 9. The larva then spins a cocoon, becomes a pupa and starts the process of metamorphosis.

This complete, ordered, breakdown of tissues and reformation to an adult bee takes 12 days. The adult worker emerges (**Figure 3**) and immediately starts work cleaning cells and feeding older larvae. At this early stage, a worker is unable to make food itself.

Worker bees in both spring and summer have a life expectancy of approximately six weeks. About three weeks is spent in the hive as a nurse bee, going through a set of activities that are dependent on the glandular development in their bodies. These activities are:

- cell cleaning
- feeding old and younger larvae
- honey processing
- temperature regulation
- wax production
- guard duty at the hive entrance.

About three weeks is then spent as a forager – flying to seek and find sources of

"Worker bees in both spring and summer have a life expectancy of approximately six weeks"

nectar, pollen, water and 'propolis', followed by death.

Propolis is the sticky substance gathered by bees from tree resins and used to seal any cracks or small openings in the hive. It has antimicrobial and antifungal properties to prevent build-up of these organisms within the nest. Foragers will travel up to three miles away from their hive in search of nutrients and the foraging range for a colony can be as much as 10 square miles.

The egg destined to be a queen is laid in a special cell which is much bigger and hangs vertically on the face of the comb, very often near the base of the frame. It is shaped like a monkey nut shell. The egg is the same as a worker egg and hatches after three days but the larva develops differently owing to much more intensive nutrition in the form of the 'royal jelly'.

Worker larvae do receive some royal jelly for a few days and then are fed a less nutritious 'brood' food. Queen's cells are fed much more royal jelly constantly and are visited by nurse bees about 10 times more frequently. This stimulates hormonal differences that allow a queen to develop. A queen cell is capped with wax at Day 8 and emerges as a queen at Day 16. Day 8 is significant because the capping of queen cells will signal the process of swarming where the old queen and half the workers will leave to find a new home. There may be one or several virgin queens emerging and they will fight to the death until only one remains.

Drones arise from unfertilised eggs which the queen starts to lay in about April every year. The eggs are laid in slightly larger comb cells prepared by the workers. The queen measures the cells with her legs and is able to distinguish a worker cell from a drone cell. She will not express any sperm on to an egg in a drone cell. The mechanism of how this is achieved is not clearly understood; although the drone cell has a more prominent domed capping to a worker cell.

The cell is capped at Day 9 and has a longer pupal phase of 15 days, emerging at 24 days from egg laying. This extra few days has significant bearing on the relationship to the life cycle of the *Varroa destructor* mite.

Many more fascinating insights about the natural history of honeybees will be discussed in the second part of this article to appear in *Veterinary Practice Today* shortly. ■

PPD Questions

1. When did eusocial bees first appear on Earth?
2. How many eggs can a queen lay in a day?
3. What is the name of the development process of an unfertilised egg?
4. What is the individual unit of a compound eye called?
5. What is the pheromone produced by the queen's mandibular glands?

Answers
1. 32 million years ago **2.** Up to 2,000 **3.** Parthenogenesis
4. Ommatidium **5.** 'Queen substance'

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The psychological contract

The psychological or emotional contract is a complex and intangible concept. It is not a tool or process, but an essential feature of managing people and running a business. It is becoming of increasing importance, now that the concept of jobs for life and its accompanying automatic loyalty is seen by many as a thing of the past.

Deborah Croyle

Following successful careers in customer service and people management, Deborah Croyle joined the veterinary business sector in 2002, and has held roles in it as diverse as receptionist, practice manager and business director. She has a miniature dachshund which was born blind, another older dachshund, two cats, a rabbit and a tortoise.

**Suggested Personal & Professional Development (PPD)*

COMMUNITY REVIEWED™

PSYCHOLOGY

The psychological contract – as seen by every employee – represents the balance between how they feel they are treated by the employer and the 'discretionary' effort they are prepared to put into their job. It is not the same as the employment contract – a written and legally binding document, to which the employee probably has little input beyond accepting and signing it. The two together define the employment relationship.

Formation

The psychological contract starts to form during recruitment, based on impressions gained from the job advertisement and impressions added during the interview. It continues to develop during induction and settling-in, while both parties are checking their expectations of – and obligations to – each other. It is fluid and changeable, so what it contains and how well it is perceived to be fulfilled will vary from time to time. What was satisfactory yesterday may not be satisfactory today – but it may be satisfactory again tomorrow.

It is formed in part on custom and practice. So if, for example, a receptionist has never worked on a particular day, he or she may expect not to be asked to do so, even if their days of work are not specified in writing. It is not set down anywhere in writing, although there may be elements included in various policies, such as a practice's policy on fair and proper internet use, or its employee discount scheme. In this way it resembles an iceberg, the part you can see above the water is a small fraction of the whole, and the part below the water is formed of the unwritten expectations below.

> "The unwritten expectations, beliefs and perceptions that exist between an employer and their employees"

There will also be a similar psychological contract between employees that helps form their working relationship.

Expectations and obligations

Although there will be much in common between employees, each individual's psychological contract will differ. Some of the examples below are motivators that will vary from one individual to another – they may also be important only when absent; for instance, an employee may feel that there is something lacking if the practice does not offer a staff discount scheme, yet having no pets, never have reason to use it.

The employee may for example expect the employer to provide:

- fair treatment compatible with others, and that others' poor performance will be addressed
- smart and clean uniforms or protective clothing
- security of employment and hence a continuing and stable income
- free or subsidised CPD
- recognition for their ideas, input, and achievements – maybe by a mention in a house newsletter or by payment, such as bonuses
- workable systems, such as reliable and fast IT systems or low levels of bureaucracy
- facilities – a clean and well-equipped kitchen and toilet and a rest area for breaks
- autonomy – the ability to control their own working life and make their own decisions
- environmental control – the freedom to adjust heating, lighting as desired
- 'perks' such as pet food samples or flea and parasite treatment
- work-life balance – the ability to balance the practice's needs with their own (e.g. to leave early on a special occasion or to attend a medical appointment during working hours).

The more of these you provide, the stronger your psychological contract with your employees is likely to be. You might also offer a seasonal event, such as a Christmas meal, free tea and coffee, or a 'salary sacrifice' scheme, such as for childcare vouchers.

The employer on the other hand may expect the employee to provide:

- flexibility in the arrangement or number of hours worked, such as varying start and finish times, or overtime to provide holiday cover
- mobility between branches, or between tasks, such as a nurse covering reception

- loyalty and commitment – promoting the organisation externally
- effort – a fair input for the time they are at work
- results commensurate with their input and hours
- custom – to patronise the practice with their pets rather than a competitor.

Fairness and equality

A practice owner may have varying expectations of employees, whilst still treating them equally or fairly. To some, fairness means treating everybody the same; to others it means treating each according to their abilities and needs. So, to an employee with family or dependants, leaving work promptly at their due time may be important; whereas to someone without such ties it may be of less importance.

This in turn will influence the owner's psychological contract with those employees – they will subconsciously expect one to remain available for last-minute consultations but not require that of the other. It is likely also to vary with employees' age and generation – people have different wants, expectations and attitudes. For example, one may see nothing wrong with having their phone on or updating their social media account whilst at work; whereas someone else may see that as unacceptable.

Bringing it to the fore

The psychological contract will also vary with the owner's management style. An autocratic owner may believe that because they pay the wages they should make the rules, and in this case the psychological contract will be small.

A democratic owner, however, might recognise that people work for many reasons, and that the more they understand and meet these, the better and more loyally their team will work, leading to a much stronger and more overt psychological contract.

The psychological contract will be even more conspicuous when an employee or employer believes it has been breached. When all is well, it remains inconspicuous, but will come to the fore when people are unhappy, particularly in times of stress or change.

The change need not have been initiated by the practice; it may be that an employee's domestic circumstances have changed and that what suited them at work no longer does so, and hence the psychological contract weakens.

In times of change

In times of stability, the psychological contract between an owner or employer and their employees is likely to remain stable. In times of change, however, it will weaken according to the level of uncertainty and perceived threat.

For example, if the owner announces that they can no longer afford to fund a Christmas party, the psychological contract will weaken out of all proportion to the financial cost involved. If the party is then re-instated the following year, it will not necessarily strengthen the psychological contract by the same amount – employees may just feel that it is something they are owed anyway.

If the change is major, such as an expansion or opening of a new branch, then on the face of it this is good news and provides opportunities for employees to progress and develop, and the psychological contract should strengthen accordingly. However, that major change brings with it major uncertainty, and the psychological contract will initially weaken, and not strengthen until the uncertainty is dispelled.

This is one reason why effective two-way communication is so essential in times of change. Not only do employees need to hear the latest news straight from the owner, they also need the opportunity to air their own concerns and have these recognised and addressed. Generally, those employees who feel they have done well out of the change will then have a stronger psychological contract with the practice or owner.

Outside of employment

There is also a psychological contract with suppliers, contractors and clients. As a practice owner, you may receive various benefits from different suppliers in return for your custom and loyalty – for example, one is generous with samples, another with discount

levels, and another with sponsorship for CPD. Much of this will be based on history, how long you have dealt with that supplier's representative and how they have helped you in the past.

These are unwritten arrangements to which you have become accustomed, yet if that representative moves or leaves and is replaced by another, the relationship – and hence the psychological contract – has to be re-established. Even if the tangible benefits of dealing with that supplier remain the same, you may feel that your psychological contract with them is now stronger or weaker, simply because you get on better or not so well with the new representative.

There will be a similar psychological contract with a contractor such as a plumber or electrician, particularly if they have, for example, helped the practice out in an emergency – here the psychological contract may be surprisingly strong.

Similarly, a client may have a feeling of loyalty to the practice, particularly if, for example, the team has achieved a seeming miracle in saving their pet. They have a psychological contract with the practice, or even a specific team member, based again on history, with expectations of what the practice will be able to do in future, and at what cost.

All the time this is fulfilled, they will continue to bring their custom to the practice; they may even feel obliged to do so. If however the practice increases fees noticeably, or withdraws services, the psychological contract is likely to be weakened.

Strengthening your psychological contract

Take a few minutes to reflect on the strength and content of the psychological contracts you have with your team, and how you can build on and improve these – there may be something small that would make a significant difference.

A good way to start would be a team meeting where everyone identifies what they expect from the practice; and what they feel the practice can expect from them. Discuss these allowing ample time for all points of view. Take action where practicable, such as by implementing ideas from the list of employees' expectations.

However, even discussing the psychological contract with your team will help to strengthen it by bringing it to the fore. ■

"Although there will be much in common between employees, each individual's psychological contract will differ"

PPD Questions

1. How does the psychological contract differ from the employment contract?
2. When and how does it start to form?
3. Is it the same for all employees?
4. How may it be maintained in times of change?
5. Where else may there be a psychological contract?

Answers

1. It is informal, unwritten, unenforceable, and may change day to day
2. During recruitment, through the advertisement and interview, and during induction and settling-in to the new job
3. No, it will vary from one employee to another, depending on their wants, needs, abilities, attitude and circumstances
4. By thorough communication, providing up-to-date information and listening to concerns
5. One may exist with suppliers, contractors, clients, and between employees

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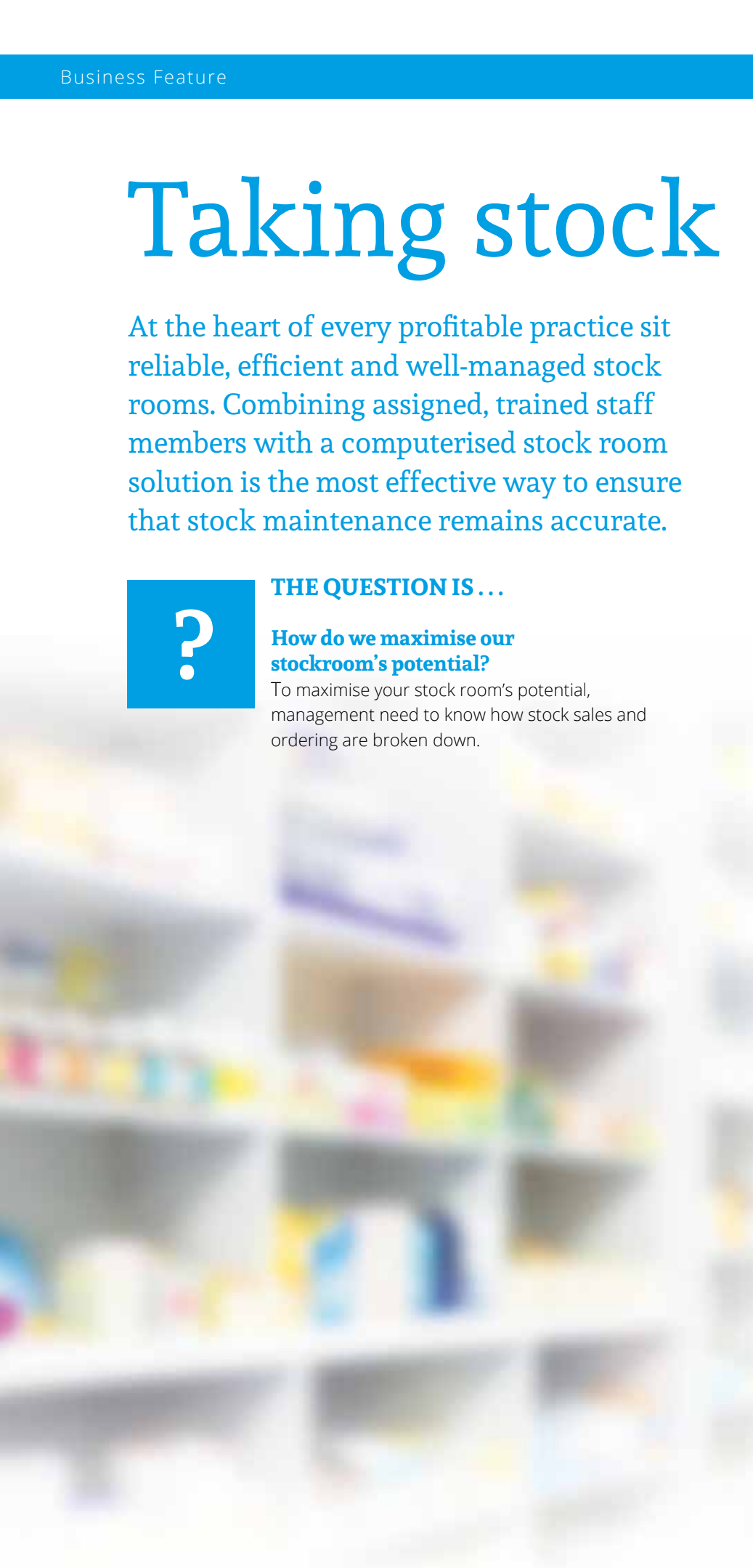
Taking stock

At the heart of every profitable practice sit reliable, efficient and well-managed stock rooms. Combining assigned, trained staff members with a computerised stock room solution is the most effective way to ensure that stock maintenance remains accurate.



THE QUESTION IS . . .

How do we maximise our stockroom's potential?

To maximise your stock room's potential, management need to know how stock sales and ordering are broken down.

The purpose of your practice management system should be to support fast and accurate stock control, which, once established should need very little altering and adjustment. Time consuming pill counting and box ticking are rapidly becoming obsolete. So how can you best use your practice management system to maximise the potential of your stock rooms?

Organising your stock rooms

Well organised stock rooms are essential, both physically and electronically. The layout of your stock rooms could be reflected in how products are grouped together on your computer system. The principles of grouping products together is fundamental in stress-free location of stock items on the shelves.

Profitable stock rooms

For efficiency and consistency, prices and mark ups should be assigned to pre-determined groups created by your practice, according to your client base distribution. Certain product groups may command additional fees including dispensing, injecting or administration fees. The consistency provided by a high functioning electronic stock room will ensure that, provided the groups are correctly set up, charges will automatically be added at the point of sale or dispensation.

Knowing your stock rooms

To maximise your stock room's potential, management need to know exactly how stock sales and ordering are broken down. It is essential to be able to produce, collate and store all stock information for subsequent reporting and analysis on a range of areas including usage, movement, valuation and batch life expiry (wastage). This information needs to be backed up regularly and available for date specific reporting at any stage.

Multiple stock rooms

Many multi-branch and mobile veterinary surgeons face the challenge of not

only ensuring a central stock room is appropriately stocked, but that stock transferred is accounted for. Having an automated, yet interlinked multiple holdings option as part of your electronic stock room is key to ensuring all stock is accounted for and that branches and mobile stock rooms run efficiently. It is also fundamental to ensure that stock transferred between locations is replenished at the source to maintain your base levels in your main stock room.

Maximising stock potential

In order to price, stock and accordingly sell items for different purposes, your management system should enable your practice to sell one stock item for different prices and purposes. This may be particularly useful for mixed practices needing to dispense variable quantities of drugs.

It is therefore crucial to be able to create and assign prices and amounts under one stock heading, but separate invoicing options. Accordingly the dispensed item will then be deducted from the stock room in the amount dispensed, but the pricing will reflect the purpose of the sale.

Linking your stock room to your suppliers

Maintaining an electronic link with your suppliers is pivotal to sustaining compatible stock codes and pricing. The electronic link should also enable pricing within your practice's invoicing to reflect the cost of the item from the manufacturers or suppliers. Supplier pricing, discounts and increases can then be passed on to the client, at the practice's discretion, without having to rely on manual inputting of price changes. Since the selling price is calculated according to the purchase price this enables the discounted price to be passed on to the customer if this is the practice's policy.

Batch codes and product tracing

In the event of a problem, it is crucial to be able to trace batch numbers and drug dispensing by client and veterinary surgeon. An electronic link with your supplier can enable batches of vaccinations and certain controlled substances to be transferred, on arrival, to your computer system. When prompted, veterinary surgeons should be required to input batch numbers.

For multiple batch recording solutions in practices with a regular large stock order, a barcode scanner or equivalent may be a worthy investment. A barcode scanner can ensure that batch numbers sold are accurate. By recording batch numbers on arrival, wastage and expiry reporting should also be possible.

When dispensing and managing stock control of dangerous or unlicensed drugs, batch number recording will ensure that controlled drugs are monitored for safety purposes. Batch recording will also enable surgeons to retrospectively access client records in the event of a product recall.

Using your staff knowledge

It is worth bearing in mind the benefits of a generated 'suggested order' which can manually be adjusted to best accommodate the fluctuating and changing levels of drugs and supplies required. The direct link between your stock room and supplier facilitates a base line order. However, it is worth considering how best to combine automated order with your staff's sales and prescription knowledge.

Intermittent reviews of stock levels, pricing and requirements and regular communication about item sales and distribution will give management staff an accurate overview of the practice's ongoing stock requirements.

The Spectrum solution

The Spectrum Practice Management System has been developed to address the importance of a reliable and efficient stock room solution. Stock ordering requirements of the fast-paced veterinary practice are ever changing and need continuous monitoring and adjusting. Spectrum delivers both intuitive and user friendly features, without compromising on intricacy and accuracy. ■

Kristie Faulkner

Kristie is the business manager for Onswitch and has over 18 years of experience in the veterinary sector – with previous roles including head nursing, practice management and working within the pharmaceutical industry.

Having seen the industry from all angles, Kristie has developed a passion for excellent customer and veterinary care provided by efficient and motivated team members within a well-run business.

*Suggested Personal & Professional Development (PPD)

COMMUNITY REVIEWED™

COMMUNICATION

Communication in practice

The importance of good communication, or the cost of poor communication, in organisations, cannot be exaggerated (Kitchin, 2010) and this is especially true in our line of business. Internal communication between teams, communicating with clients through website or social media and face-to-face communication in the waiting or consulting room – they all matter.

Let us think first of the potential challenges between individuals and teams in practice, such as issues with certain individuals, shift handovers, branch practices and managing teams.

Internal communication

Often there are repeated internal communication issues that can lead to friction, inefficiency and a poor working atmosphere. These may simply be rooted in a genuine lack of awareness or understanding. Do members of the reception team fully understand the role of the veterinary surgeon? Can they appreciate how relentless consults are?

A new customer, a new pet and a new set of problems walking through their door every 10 minutes; theatre in-between and no lunch. Is there an appreciation of the impact of 'just squeezing another appointment in'?

Do the vets understand the daily realities of juggling the demands of reception? More often than not undertrained, with multiple telephone lines ringing constantly through the day, clients often begging to be squeezed in, maybe complaining, wanting updates on in-patients, ordering repeat prescriptions, clients coming in, clients waiting to pay, calling for general advice and so on. The clinical team often overlooks the intensity of the reception role.

On to the nursing team, running the daily gauntlet of being all things to all people – carers, cleaners, anaesthetists, dental nurses, lab technicians, radiologists, managing intensive care, consulting, discharging, admitting, processing insurance claims, providing shoulders to cry on and a wealth of information about all things pet!

Veterinary practice brings together a range of people with varying backgrounds and education, working together in a small, pressured environment. It's no wonder that miscommunication is rife! That's why understanding the tasks, responsibilities and workload of colleagues is the first step towards building effective communication.

Establishing the basics

Let us consider your practice vision and mission. What is the purpose and goal of your business? To stay afloat? To build a small group? To be the best practice in your town or region? Whatever it is, every single member of your team needs to know what you are trying to achieve and how their role will help.

Next, job descriptions. Are they up to date and mutually agreed by the team member and manager? Each person will have individual duties specific to their role and they should have access to all the correct tools. Each team will know how they impact on – and help – the next, working towards the common purpose of providing excellent patient and client care.

Communicating clearly and consistently

In broad terms, dictionaries define the word communication as 'the imparting or exchanging of information by speaking, writing, or using some other medium'. There are, however, four elements to communication (Kitchin, 2010):

- communicator – someone who needs to communicate a message (fact/opinion/instruction/information)
- encoding – turning the information into a message (words/diagram/facial expression)
- communication medium – how do we deliver the message? (Speak face-to-face/telephone/email/letter/body language)
- receiver – the person who needs to receive the communication and decode it so that they understand the message.

Clearly there are multiple channels and styles for communication. Are you someone who needs to hear things direct? Do you prefer it written down? Do you need both? Communication failure happens often, and can occur more easily than you think, because it requires both parties to speak and hear the same message. Original messages and instructions can easily be degraded between the individual stages of the communication chain.

There are many different ways in which we communicate messages in practice, just as there are many different types of message being communicated to many different people.

A message to call a distressed owner immediately, written on a scrap of paper and placed in the vet's pigeon-hole is not an effective way to communicate this important matter. A telephone call to discuss a sensitive performance issue with a member of staff is not acceptable, even if said team member works in another branch and logistics are challenging. A change in dosage for an ICU patient is not best communicated by asking another team member to pass the message on.

Time pressures can often lead to messages being delivered by 'lean' routes such as email or a written notice; yet people actually respond more effectively to rich face-to-face communication (Kitchin, 2010).

Osigweh and Hutchinson (1989) state that most workplace problems result as a failure of the employer and employee to satisfy the expectations of each other. This means that making time for regular annual appraisals, biannual progress meetings, monthly staff meetings and heads of department meetings is crucial to keep teams aligned to the practice vision and working effectively.

Essential elements of effective communication

In any practice, it is important to ensure four principal elements in the communication process.

Quality of communication

Use consistent, persistent and repetitive communication, employing appropriate media depending on the type of message to be communicated (Soumyaja et al, 2011). Rich face-to-face communication is almost always better than an email and allows for two-way communication.

Participative management

Just as medication, treatment plans and surgical techniques evolve, so should the way in which the practice operates – optimising opening hours, shift patterns, processes and so on in order to remain competitive. Involve the team in the decision-making process early on, and they will be less likely to resist change and more likely to commit in the long term (Kirkpatrick, 2001).

Quality information

Providing relevant and timely information will reduce the 'grapevine' effect, which increases team members' resistance to proposed change and causes unrest (Kirkpatrick, 2001). The information provided should be easily digestible, delivered using different media and should be relevant to individual employees or teams (Sounyaja et al, 2011).

Regular practice meetings

'Whole-practice' and departmental team meetings facilitate alignment of everyone to the same goal and help individuals and teams work together more effectively.

Communication tools

Mehrabrian's model states the importance of facial expression and body language in the communication of feelings and attitudes (**Figure 1**). It suggests that seven per cent of meaning is derived from the actual words (email/notice), 38 per cent from tone of voice (phone/face-to-face), and 55 per cent from body language and facial expression (face-to-face).

Another useful tool is DISC profiling. Apart from offering an insight into the different personality types in the team, this tool provides excellent information as to how best to communicate with each personality type – assessing personality and predicted behaviour in certain environments and situations.

There are four personality types, and everyone has a mix of each in different degrees (**Figure 2**):

- Dominance – driven, direct communicators
- Influential – thrive on praise and recognition
- Steadiness – like clarity, routine and security
- Compliance – perfectionist, information gatherers.

As well as informing how best to communicate with each personality type, profiling uncovers what motivates individuals. DISC profiling thus allows the team to understand each other better and identify strong candidates to join the team in the future.

External communication

In 'Generation Millennial', the online and social media space is no longer something you can choose to ignore. An online presence is a necessity, and the message you communicate to your clients and potential clients needs to come across loud and clear.

Take a look at your website. Is it a mirror image of your practice? If your website is dated, clunky and visually unappealing, then you may be putting people off before they even get close to walking through the door to see what you are really like.

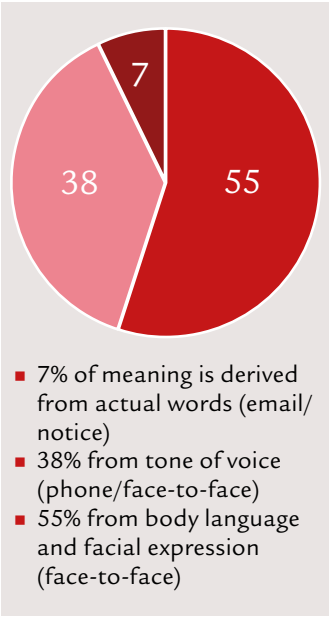


Figure 1. *Mehrabian's Model showing the importance of facial expression and body language.*

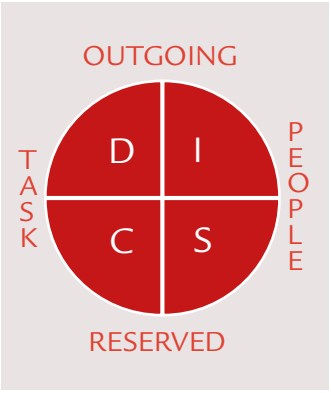


Figure 2. *The four personality types.*

When browsing for a hotel online, how many do you discount purely on the basis of the 'look and feel' of the web page? Do you check actual travellers' photos to compare with the professional ones?

Our clients are doing the same when they are looking for a veterinary practice.

These attributes need to stand out on your website; rather than how many diagnostic or surgical 'toys' you have in the practice. The primary role of your website is to engage with new pet owners, not to advertise for new staff.

Similarly, marketing materials should communicate that you are a modern, friendly practice with a solid and consistent identity. And every single member of your team needs to convey that message – from the telephone, to the waiting room, to the consult room, and back again. Communication has to be effective if we want our message to be heard.

External communication is essential, because it is vital to keep attracting new clients. Each year you will naturally lose up to 25 per cent of your active client database, so aim to attract at least 20 new clients per FTE (full-time equivalent) veterinary surgeon per month. Contact details must be collected so that text reminders and emails can be used – along with social media – to ensure that well-timed and relevant messages are communicated. This includes patient-specific information, such as nurse clinics for senior pets, newsletters and seasonal preventive healthcare.

Consulting room communication

The consulting room is the heart of the practice, and clients – our customers – are the lifeblood. They bring with them our patients.

Customers may go elsewhere when prompted by communication failures, which are often centred around care and value perceptions (Bradford Swift, 2012) – in turn negatively affecting patient care through inadequate compliance. Owner dissatisfaction can also result from poor rapport and lack of explanation.

Great communication in the consulting room requires just a few key features.

Good rapport from the outset

Think of the relationship you have with regular clients. The greetings and conversations between you are easy and recommendations seem to be taken more freely. This is because you have rapport with them, and rapport builds trust. First impressions count – a warm welcome, introduction and making a fuss of the pet go a long way.

Use open questions

Do not assume you know the full story from the appointment summary. Use open questions such as "Tell me how Molly is doing at the moment" instead of "So, here for her booster then?" This allows the customer the opportunity to speak, and gives you an agenda on which to build rapport, starting with what most concerns the customer.

Perform an 'obvious' pet examination

If the customer is still answering questions, she is not aware that you are performing a full health check. Have you ever heard the muttered phrase, "I was only in there for two minutes"? Make it obvious that you are checking every part of Molly – narrate what you are doing and focus on the bits which concern the owner first.

Make clear recommendations

That is what customers are paying you for! So back to the varying styles of communication – don't just tell the client what you are seeing, feeling and hearing; show them. Utilise diagrams, joint models, MP3 stethoscopes, video auroscopes, and white boards to connect owners to your findings. Make clear recommendations, using that very word.

Kanji (2012) found that groups of customers who were given clear recommendations regarding dental treatment, were seven times more likely to comply than those where ambiguous suggestions were made.

Estimate

An estimate is a 'must do' – and not just for the major stuff! A booster appointment ending with a six-pack of flea treatment, wormer and bag of food will be closer to the £100 mark than the initial £38.50 quoted for the vaccine.

Re-book

Communication means staying in touch; whether that is for the vaccine due next month, a re-examination or appointment booked to see the nurse regarding weight issues. Book it whilst the customer is in the practice.

Summary

Good communication in every aspect – between individual employees, practice teams and the paying customer – is vital for veterinary businesses to thrive. By using the areas discussed in this article, you can review where, and between whom, communication failures arise, and start to make changes to benefit everybody, especially the pets whose welfare is entrusted to our care. ■

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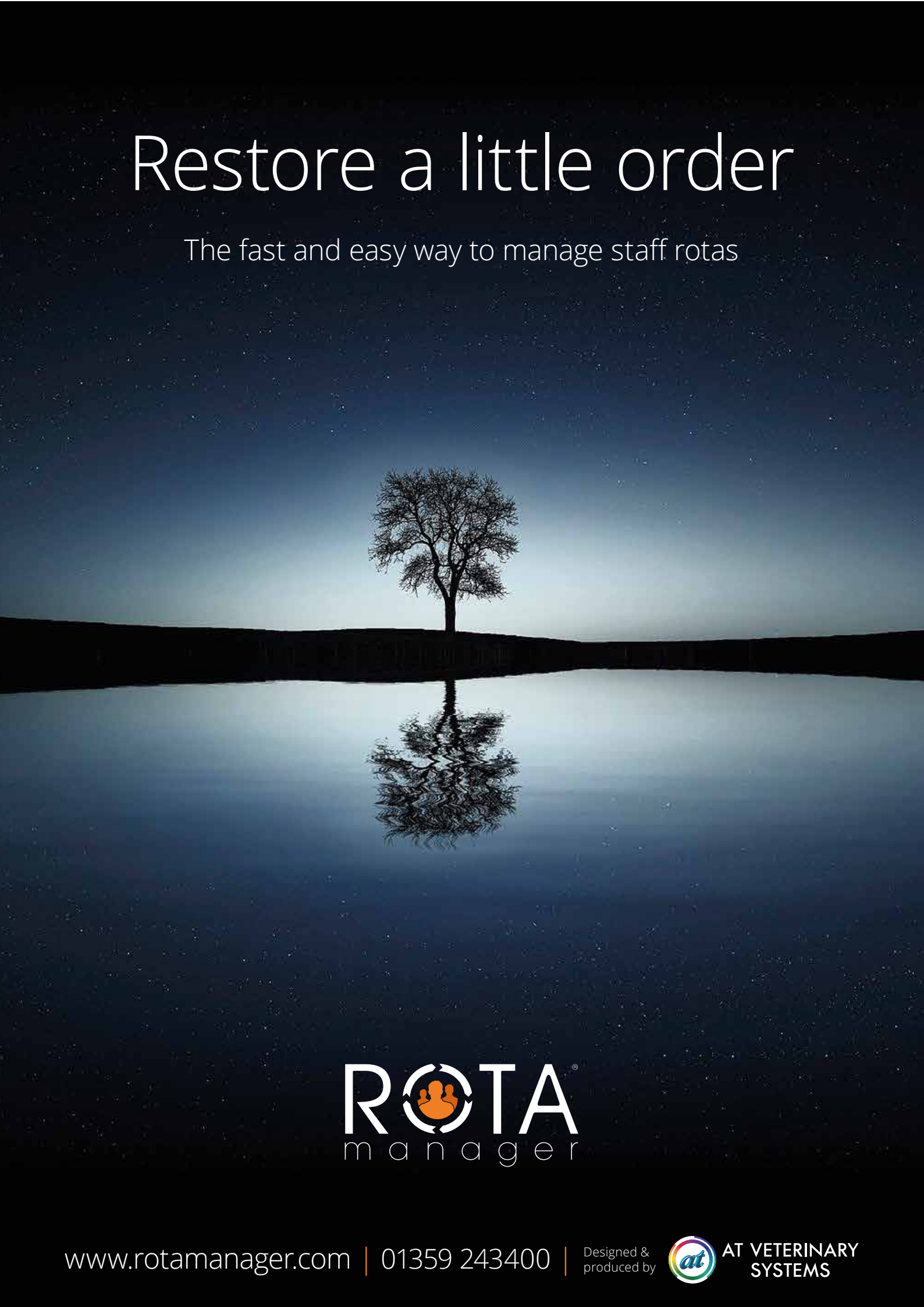

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Shifting paradigms

Good business management in practice has always mattered; but it is now essential for any veterinary practice if it is to survive in a highly competitive market.

From very small beginnings, 23 years ago, the Veterinary Practice Management Association (VPMA) has become a well-recognised organisation for representing and promoting good practice management; and its recent combined congress – held with the Society of Practising Veterinary Surgeons (SPVS) – was indicative of just how far the whole subject has advanced in terms of its significance and 'street cred'.

The four streams of lectures at the congress highlighted the widening scope of practice management and the range of skills required – exemplified in an excellent session entitled 'The World's Worst Website', in which delegates were shown what to do and what *not* to do when designing their practice website. This involved a certain amount of complex technology that needed to be understood by anyone attempting the task and demonstrated just how versatile the general practice manager now needs to be.

Specialisation inevitable?

There were lectures on marketing, leadership, benchmarking, health and safety, business models and well-being, all underpinning the vast area of knowledge required to manage a veterinary practice. Although in a small practice, a manager is still able to accommodate the broad range of tasks involved in running the business, in corporate practice and large independent practice groups – sometimes comprising hundreds of surgeries – there has been an inevitable move to specialisation in management tasks. And this is becoming the norm.

All this does beg the question – 'What is the future of the practice manager?' It was suggested by one of the congress speakers that by 2020, 50 per cent of veterinary practices would be corporate owned. The traditional, 'Jack of all trades', practice management role is being squeezed into a smaller and smaller sector within the veterinary industry; so how do potential practice managers decide on the nature of the training they need to follow to move into the industry?

Do they need to gain a general management qualification first and then specialise; or should they concentrate on the areas of management to which they think they are best suited and ignore the rest? Does this mean that there will no longer be managers who have an overall view of the business? And does this matter, especially in the large veterinary organisations where managers answer to boards of directors making final decisions rather than a practice owner or a group of partners?

Paradigm shift or predictable paralysis?

To survive, we need to accept a shift in our paradigms. Paradigms are not a new concept, they are our set of assumptions about the world in which we live and are comfortable in. It is these comfortable paradigms that can limit our success, both personally and in the business world. Paradigm shifts are uncomfortable, because most of us want to cling to what we know – to the familiar.

Paradigms can take a long time to shift. The idea that the Earth was spherical originated in Ancient Greece but proof only came when Magellan circumnavigated the world in 1522. Rick DeBowes discussed this in his lecture at the congress and illustrated the point by showing how our veterinary paradigms have had to change over time. For example:

- a male-dominated profession moving to a female-dominated profession
- a predominantly cattle- and equine-based profession moving to a small animal and exotics profession
- general veterinary medicine moving to specialisation
- little or no pain management moving to full pain management
- the concept of pets as animals moving to pets as children
- communication and marketing using practice newsletter/leaflets moving to the internet and Facebook.

There was also a fascinating lecture given by Dan Forster and John Goulding which took a mindset – that of discouraging home visits – and turned it on its head. Both vets were running very successful home visit services that worked well for clients and veterinary surgeons. Dan and John had moved on from the paradigm that home visits should be avoided and structured their service in such as way that their version of the home visit was a success.

'Paradigm paralysis' is the inability or refusal to see beyond the current models of thinking. It seems that in the future we will be needing to shift our paradigms quite significantly if we are to avoid this pitfall and to succeed and thrive in the brave new veterinary world. ■

Industry Profile

Christopher Laurence
MBE QVRM TD BVSc MRCVS

What drew you to become a veterinary surgeon?

When I was aged about 11, we had a goat named Tansy that my parents kept to keep the scrub down around our house in Sussex. As with all goats allowed to rummage around, she ate something she shouldn't have and so the vet was called. He came along and gave her an injection and she rapidly recovered. I was duly impressed and thought that would be a great career.

Please give us a thumbnail sketch of your professional career.

I spent almost a year in mixed practice in Somerset, which was enough to convince me that I didn't want to continue with large animal work. I moved to Chippenham to do solely small animal practice in 1969. As with many practices, the large animal work gradually shrank over the years and the small animal business increased so that the ratio between them changed from 80:20 large to small to 20:80. By the time I left in 1998, we had a veterinary hospital and three branches.

Having spent almost 30 years in practice, I wanted to do something different. I saw advertised the job of assistant chief veterinary officer of the RSPCA, based in Horsham where I'd gone to school. I was already very involved in the Chippenham Branch and I was pleasantly surprised to be called for interview – and even more surprised to be offered the job.

Sadly, after only three months, the Society's chief veterinary officer, Jim Phillips, had a recurrence of a cancer that had been treated some years before. He was dead within a few short months and I found myself as his replacement. In 2003, a new CEO started to re-organise the Society in a manner which I thought was fundamentally flawed and so I looked for other jobs.

Luckily, Dogs Trust's veterinary director, Paul Devile, wanted to retire and I took over from him. I spent a very happy eight years expanding his role as the charity grew to provide even more facilities for unwanted dogs. I retired at 65 and have since become a trustee of several charities that keep me fully occupied.

Is becoming a veterinary surgeon just a career or should it still be considered more of a vocation, with all the flexibility and self-sacrifice that implies?

When I graduated there was no question that veterinary practice was a vocation – and a very privileged one. There were considerable sacrifices then: long hours with frequent on call; relatively poor pay; and the restrictions imposed on the family when on duty because my wife was tied to the phone when I went out on a call.

Today, mobile phones and out-of-hours services have radically changed work-life balance for the better for practising veterinary surgeons. There are now also much more varied careers into which veterinary surgeons can go. The old choices of practice/industry/government/research/teaching are now so much more varied and many veterinary surgeons have risen to very senior management levels in a huge variety of careers. I know there has been comment recently about practitioners 'looking down' on those in other careers, but I don't take that view.

In the modern world, 'jobs for life' are a thing of the past and I believe the variety of opportunity now available to veterinary surgeons is a credit to the professionalism of our current graduates. What is more, it allows those who wish to change direction in their careers more flexibility to do so; and that must be positive, especially when matters of stress and mental health are high profile issues.

Sadly, social attitudes have changed and the concept of a vocational career is not in the modern psyche. The changes outlined above have allowed many who go into practice to focus as much on their personal lifestyle as on their vocation. That may not be a bad thing for managing their levels of stress, but it is certainly a significant change.

What are other changes to the profession that you have witnessed since qualification?

Apart from the changes in practice distribution – from large animal to small – and to lifestyle as mentioned above, the most significant change is in our ability to diagnose and manage disease. Advances in veterinary medicine have unravelled some syndromes that were mysteries when I was an undergraduate.

For example, all skinny old cats had chronic kidney disease even if you were lucky enough to have access to a decent laboratory and urea was normal. The small lump noticed under the ventral neck (even if it was noted) was not regarded as relevant! External fixation for fractures with Plaster of Paris was about all that was available for the practitioner.

The changes in our ability have been exponential and, as a profession, we seem to be running to keep up with the 'medics'. It is often said that is what clients want and I am sure that is true of many. Sometimes, however, the benefit to the animal gets forgotten, and procedures are undertaken when the animal's best option might well be euthanasia.

I don't for one minute suggest we should abandon much of the good that we do; but Princess Anne often says "Just because we can, it doesn't mean we should" and I wholeheartedly agree.

What do you think are the most critical issues affecting the profession today? How should they be tackled?

The changes I've talked about have another implication – and that is the cost to the client. We have recently seen RSA attempt to limit the amount paid out in claims by restricting access to referral centres, and all too often we hear the comment that "vets are expensive". While the latter comment may reveal ignorance of the real costs of running a veterinary practice, the perception is there and the RSA action implies to me that the cost of claims is escalating.

> "Sadly, social attitudes have changed and the concept of a vocational career is not in the modern psyche"

"I do not think charities focus enough on those who really need subsidies to neuter their pets"

In parallel, we have the rise of vaccination and low-cost clinics that seem very successful in providing a basic service to the pet-owning public.

And yet many in the profession seem to have their heads firmly in the sand. Of course, the smart toys in the practice have to pay for themselves. But are they really necessary? And are we producing veterinary graduates who expect – or even need – those toys to be able to work?

We must, as a profession, look at such issues and ask the difficult questions, such as are we selecting the right undergraduates and do we fill their heads with too much knowledge? Surely common things still occur commonly? I hope Vet Futures will look at these issues.

During your roles with veterinary charities, you have been particularly outspoken about pet population control in the UK and the plight of unwanted animals. What real progress (if any?) do you think has been made in solving the problem?

Sadly, I fear there has been little progress on the issues of over-production of pets and the inherited defects from which they suffer. The consequences of both have significant adverse effects on the welfare of millions of dogs and cats, as well as many other species. Millions of pounds have been spent by charities in subsidised neutering with little apparent effect and we should question why.

I think the answer is in two parts. First, I think current social culture is "I want it and I want it now, no matter how inadvisable my acquisition may be." With internet sales of everything now the norm, it is difficult to get the message to the public that the puppy they buy, imported from Lithuania or Hungary, is unlikely to be fit and healthy.

Legislation may be difficult but surely we should try? The licensing/registration of *all* dog breeders, no matter how frequently they breed, would be a good start. A requirement to include the licence number on any advert – with the penalty on 'the publisher' (internet, print or shop window) – if effectively enforced would be a deterrent to rogue breeders and those in advertising who turn a blind eye.

Secondly, I do not think charities focus enough on those who really need subsidies to neuter their pets. There is an argument to say that if an owner can't afford routine preventive care they probably can't afford to have an animal. However, the widely accepted social benefit of owning a pet has also to be taken into account. The recent project in Stoke – run by the RSPCA and Cats Protection to better target neutering subsidies – shows real promise for the way forward, although it is very labour intensive.

What are the responsibilities of practising veterinary professionals in tackling the problem of unwanted pets? Do you think they are taking these responsibilities seriously enough?

I have great sympathy with practitioners who are faced daily with such difficult issues. Of course they should ensure their practices are offering early neutering – particularly of cats – in line with modern thinking, as well as advocating appropriate neutering policies. Sadly some practices are still a decade out of date and some even recommend a litter first, thereby exacerbating the problem. But it is difficult to see what individuals can do. Of course, assisting charities in targeted neutering by limiting the fee is very helpful and allows the 'charity pound' to be spread further.

Charities generally have been receiving a 'bad press' recently with regard to their fundraising activities. What safeguards are there to prevent this happening in the companion animal sector?

Charities are 'between a rock and a hard place'. We are all desperate to maintain our voluntary income as the legacy element looks increasingly unreliable. And, of course, we are in competition with each other for animal welfare donations. Consequently 'warm' contacts are important in fundraising efforts.

The issue is co-ordination between charities, so that unreasonable pressure is not applied to any single generous individual. There has never been any system to provide that co-ordination and I believe that we must put something in place. There is – and always has been – a will to safeguard vulnerable donors, but putting in place protection of them will not be quick or easy.

What role do awards, such as the CEVA Welfare Awards, play?

There are so many people out there putting in enormous efforts to help animals in so many ways; but they are rarely recognised for their dedication. Not only are they focused on helping animals, many are putting themselves at personal risk by doing so, especially when working overseas.

What better way is there to recognise their contribution and publicise their efforts than by using high profile events such as the CEVA Awards? When the bottom line is often the primary focus for companies, it is also good to see industry giving something back to help the welfare of the animals that are their source of profit. ■

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