

Veterinary PracticeToday

FOR PERSONAL & PROFESSIONAL DEVELOPMENT

'De-extinction' on the edge

Fraught with controversy



Varroa mite

The beekeeper's nightmare

Emergency medicine

A practical approach to the emergency patient

Feedback from the abattoir

Essential for on-farm health control

Reflective practice

Why it matters



Independent veterinary practice; the best choice for a successful career.

To find an independent practice visit:
www.independentvets.co.uk



Federation of
Independent
Veterinary Practices www.fivp.org.uk



Providing Perfect Solutions

PPS GI provide a full portfolio of general insurance products and services exclusively to the veterinary profession.

Veterinary Insurance & Services

- ▶ Tailor Made Surgery Insurance
- ▶ Locum Insurance
- ▶ Equipment Finance
- ▶ Private Medical Insurance
- ▶ Motor Fleet
- ▶ Home Insurance
- ▶ Practice Sales & Goodwill Valuations



CALL 01527 909200



WWW.PPSGI.CO.UK



PPS GI is authorised and regulated by the
Financial Conduct Authority.

UP FRONT...

The weight of expectation

"I gave it everything I could," she said. Four times in the space of two minutes actually. "I gave it everything I could".

But this wasn't enough for the pushy interviewer, who piled in the questions relentlessly; seemingly having no sensitivity to the fact that this 24-year old veterinary student – still trying to regain her breath – had just run 1,500 metres in a world final against a field of national and international champions and missed out on a bronze medal by just seven thousandths of a second.

Even under this completely unreasonable pressure, Laura Muir kept her cool and integrity by pointing out that fourth place wasn't bad, and that she had physically and mentally "given it all that she could". And, that despite knowing the obvious – she had to react by running a bit faster – "she was tired" and simply had nothing left with which to respond.

That had been evident to anyone watching her in the final straight; but not, apparently, to the boorish BBC interviewer who was hell bent on getting his 'story' for the viewers – most of whom were probably watching in the pub or sitting on their 'couch potato' sofas at home, tucking into takeaway meals and supping cans of lager, yet apparently needing to see one of the healthiest, most promising young athletes of the day, grilled for the sake of an instant response on live TV.

In an interview for *The Guardian* on 2 August, on the eve of the World Athletic Championships, Laura explained that she is used to a packed schedule because she has spent years combining vigorous training with studying to be a vet. "I thrive on doing both," she said. "I'm very lucky that I have a lot of support and the vet school work hard to help me manage everything ... But I just want to get the most out of myself and be the best person I can be. You have to see what you are capable of. It's a lot to take on but they are the two things I love."

What an example to any aspiring young veterinary surgeon. For the realities of practice life are that achieving work/life balance is difficult ... and every other client consult will take on the proportions of that BBC live interview. Every client expecting to be treated as if they and their pet were the most important thing in your life at that moment; and, of course, wanting immediate answers. "How long will it take?" "She will be OK won't she?" "When will he be better?"

The pressure will be on. Much of it unreasonable. But, as was the case for Laura after her race, an expectation that comes with the role of a practising veterinary surgeon; and which needs handling with the same skills of patience, humility and integrity.

David Watson
Editor

You can receive *Veterinary Practice Today* by registering your details at www.MRCVS.co.uk and/or www.VNOnline.co.uk. Alternatively you can subscribe for £120 per year (plus postage and packing for overseas subscriptions) by emailing subscriptions@veterinarypracticetoday.com

Printed in Great Britain by Swallowtail Print Ltd, Norwich
Tel: 01603 868862
www.swallowtailprint.co.uk

©2017 Vision Media. No part of this publication may be reproduced in any form without the written permission of the publisher. *Veterinary Practice Today* is a trade mark of Vision Media. All other trade marks are acknowledged.



Veterinary PracticeToday

Publisher

Published six times a year by Vision Media,
a department of Central Veterinary Services Ltd.

Elmtree Business Park
Elmswell
Bury St Edmunds
Suffolk IP30 9HR

Tel: 01359 245310

Fax: 01359 245253

enquiries@veterinarypracticetoday.com
www.veterinarypracticetoday.com

Editorial

Editors

Maggie Shilcock
maggie.shilcock@visionline.co.uk
Tel: 01359 245310

David Watson
david.watson@visionline.co.uk

Associate editor

Sarah Kidby
sarah.kidby@visionline.co.uk
Tel: 01359 245310

Design

Graphic designers

Melody-Anne Neville
Gemma Baker
Bradley Young
Hanneke Lambert
designer@visionline.co.uk

Production

Publications manager

Clara Ashcroft
clara.ashcroft@visionline.co.uk
Tel: 01359 245310

Advertising

Media and marketing co-ordinator

Emily Doyle
emily.doyle@visionline.co.uk
advertising@veterinarypracticetoday.com
Tel: 01359 245310

Subscriptions

subscriptions@veterinarypracticetoday.com
Tel: 01359 245310

©2017 Vision Media

All rights reserved. Reproduction, in part or in full, is strictly prohibited without the prior consent of the publisher. The content of this magazine is based on the best knowledge and information available at the time of publication. Every effort has been made to ensure that all advertisements and editorial are correct at the time of going to press. The views expressed by the authors are not necessarily those of the publisher, proprietor, or others associated with its production. © Images used under licence from Shutterstock, Inc. and iStock.com

ISSN: 2053-440X



The paper used for the publication is a recyclable and renewable product. It has been produced using wood sourced from sustainably managed forests and elemental or total chlorine free bleached pulp. This magazine can be recycled.

Contents

Comment

COVER STORY

- 6 **Plans to 'resurrect' the woolly mammoth – fraught with controversy**

Tom Ireland

If scientific techniques progress to the point where we could actually bring such a creature back from extinction – should we?



Small animal

- 10 **More complex than 'home alone' – separation anxiety and isolation distress**

Karen Wild

Separation distress issues require specific planning and are best suited to a clinician who has suitable behavioural experience.

COVER STORY

- 14 **A practical approach to the emergency patient**

Rachael Smith and Shailen Jasani

Managing an emergency patient with life-threatening illness or injury can be challenging but also highly rewarding.

- 18 **Effect of dietary amino acid content on canine learning and behaviour**

Val Strong

The level of tryptophan – and other large neutral amino acids provided in the diet – can influence the brain concentrations of amino acids and subsequently alter behaviour.

- 23 **Nurse clinics – a benefit to your practice and your clients**

Emma Purnell

Veterinary nurses have a wealth of knowledge and can often provide the perfect link between the veterinary practice and the client.

- 26 **Investigating anaemia in dogs – causes, diagnosis and treatment**

Kerry Doolin

Dogs with anaemia will present with a variety of clinical signs based on the underlying cause, the duration of onset and the severity of the anaemia.

- 32 **Definitely better than cure**

Jane Ellison

One of the challenges faced by veterinary professionals is to raise awareness of potential poisoning risks and to provide education for owners.



Equine

- 36 **Equine anaesthesia (part 1) pre-operative patient preparation and induction**

Marie Rippingale

Discussing the main considerations involved in the preparation and induction of general anaesthesia in equine patients.

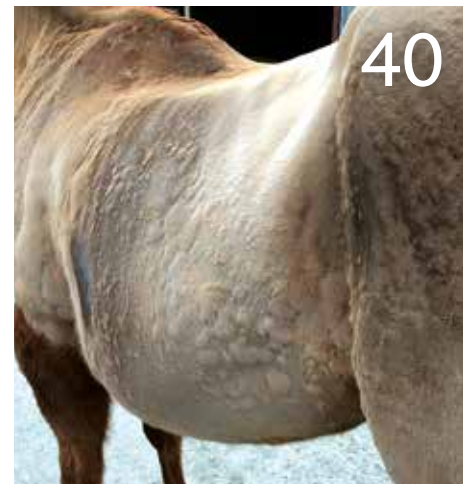
- 40 **Prevention of allergic skin disease in horses**

Imogen Burrows

Managing allergic skin disease is often a challenging experience for both practitioner and owner. Attempting to definitively diagnose the underlying causes requires a logical and systematic approach.

- 43 **Insight: All's not well that's Thelwell**

It's not just the ponies that can be overweight.



Large animal

COVER STORY

- 45 **Feedback from the abattoir – essential for on-farm health control**

Ed van Klink

All animals slaughtered in the UK are inspected – both ante-mortem and post-mortem – legislation prescribes that any information about findings should be fed back to both the farmer and their veterinary surgeon.

48 **Significant advances in cattle fertility**

David Black

There is a requirement to amplify and exploit existing genetics and improve cattle production efficiencies in order to satisfy the world's ever-increasing need for sustainable protein production.



Exotics and wildlife

COVER STORY

56 **Varroa mite – the beekeeper's nightmare**

John Hill

There are many mites that infest bees, but only a few are pathogenic. Invasive species can cause havoc in any new environment – none more so than the small, maroon-coloured mite, *Varroa destructor*.

60 **Day in the life of a 'zoo vet'**

Steve Unwin

A zoo vet's job is extremely generalised – yet in a very specific way. The sheer variety of species they treat is challenging but is increasingly becoming more clinically and scientifically rigorous.

64 **Wildlife emergencies – what to expect at this time of year**

Simon Cowell

At this time of year, many hedgehogs will be having second broods. These latecomers face a host of hurdles and, although the weather is usually mild at this time of year, it is always a race for them to put on enough weight to see them through winter hibernation.

65 **Insight: Nellie the elephant was the lucky one**

We pity the poor circus elephant crouching with all four feet on a tiny platform and being made to stand on its hind legs for public entertainment; but there is now a new focus on how we continue to harm and humiliate these wonderful creatures.



Management

COVER STORY

66 **Reflective practice – why it matters**

Hilary Orpet

Reflection has been taught within the human-centred medical curricula for many years and is now becoming more prominent in veterinary medicine – it is an essential part of integrating theory and practice.



70 **So what's so special about 'millennials'? What should we do about it?**

Alison Lambert

How millennials behave has become a huge focus for research agencies and business strategists, but in reality we all do more and more on our smartphones, use social media daily, and consult online reviews and comparison sites before buying goods and services.

76 **Dealing with employee sickness absence**

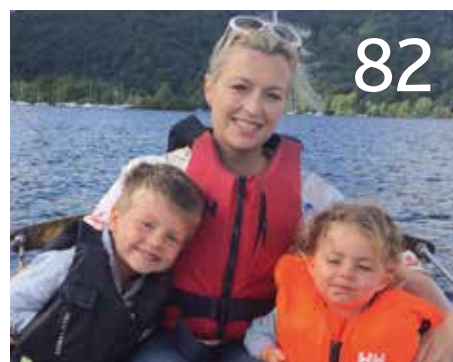
James Cronin and Kay Hamblin

A certain level of sickness absence is inevitable but what about those employees who just seem to be taking a bit too much time off, especially if you're worried it may be less than genuine?

Industry

80 **Profile**

Cat Henstridge, BVSc MRCVS
General practitioner at Peak Vets, whose interests lie in geriatric medicine and client communication.



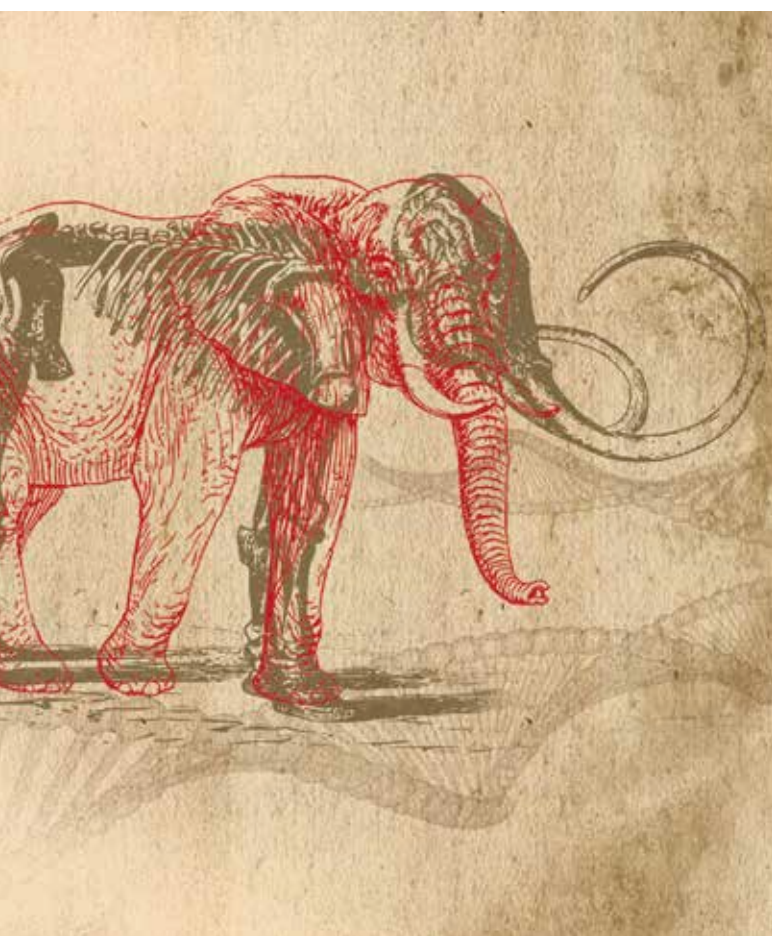
Plans to 'resurrect' the woolly mammoth – fraught with controversy



Tom Ireland MRSB

Tom is editor of The Biologist and managing editor at the Royal Society of Biology.

There are few animal lovers on the planet who wouldn't want to see a woolly mammoth in the flesh. What a sight a herd of these majestic beasts, peacefully towering over the Siberian steppes, would be. But if scientific techniques progress to the point where we could actually bring such a creature back from extinction – should we? And what if the creature we bring to life isn't quite what it's meant to be?



Not long ago this would have seemed like science fiction; but there is in fact a global scientific movement to 'de-extinctify' various lost species. In 2015, at a TEDx de-extinction symposium, scientists and ethicists discussed the resurrection of a range of species – from the extraordinary Australian gastric brooding-frog, which went extinct in the 1980s; to the auroch, a species of large cattle last seen in the 1600s – plus, of course, the headline-grabbing idea of resurrecting the woolly mammoth.

There are, in fact, several groups working on bringing the long-extinct woolly mammoth (*Mammuthus primigenius*) back to life, including researchers in the US, Russia, Sweden and Korea. The iconic species, which last roamed the Earth around 10,000 years ago, inhabited an enormous grassland habitat known as the 'mammoth steppe' during the last Ice Age, until changing climate, loss of habitat and human hunting wiped it out.

Woolly mammoths' closest living relatives today are Asian elephants – they diverged from a common ancestor around six million years ago – although the mammoth was much larger, up to 12ft in height. A newborn calf would weigh as much as 90kg. As well as having thick fur – made up of a short undercoat and longer guard hairs – mammoths had long, curved tusks and reduced ears and tails to protect against frostbite.

Enter genetic engineering

One of the leading proponents of 'resurrecting' the species is Harvard-based geneticist, Professor George Church. His plan actually involves genetically modifying Asian elephant embryos to express mammoth-like traits, such as extra fat, thick hair and low temperature-optimised haemoglobin.

Church said earlier this year that he believed that one of his 'mammoth' could be born within a few years. He plans to introduce the animals to 'Pleistocene Park', a large expanse of Siberian tundra where the Russian geophysicist, Sergey Zimov, is attempting to restore the long-lost grassland ecosystem of the mammoth steppe.

In my opinion, Church's timescale remains unlikely; but thanks to advances in gene editing, cloning, and *in vitro* fertilisation technology, the idea is not unfeasible. His team have already taken cells from Asian elephants' connective tissue and converted them to induced pluripotent stem cells – that is, stem cells that can differentiate into other types of cells.

Using the gene-editing technology CRISPR-Cas9, genes for mammoth-like traits are inserted into the DNA of these cells. These can be developed into multiple tissue types for studying the effects of mammoth mutations on the traits of cells. Further down the line, elephant embryos would be gene edited to include mammoth genes and taken to gestation.

Although the creation of transgenic organisms is now a standard part of biological research, taking a mammalian embryo – which has been altered so much that it is essentially another species – through to gestation would be 'a first' and a drastic departure from existing gene-editing applications.

In earlier statements to the press, Church has said adult female Asian elephants would be used to gestate and give birth to his experimental creatures; but more recently he announced that they would be delivered using an 'artificial womb' that has yet to be invented. He now tells me his team are looking at 'a variety of *in vitro* mammoth development models'; although in the absence of any detailed published work on the project, we can only guess what that means.

It is for this reason I feel deeply uneasy about this particular research. Scientists seem to be rushing towards this contentious goal before the scientific community and the general public have had time to discuss its profound and widespread implications – or even understand what is being done.

Unanswered questions

Firstly, is this really resurrecting the woolly mammoth at all, or is that just clever marketing for a very unusual application of gene editing for elephants? Although other research groups are working towards sequencing the mammoth genome more fully, using highly preserved mammoth specimens, Church's technique is essentially giving an Asian elephant a mammoth makeover. Even if successful, this would be an invented hybrid species created by man, not a reversal of the extinction process.

Secondly, have all the profound and complex implications of this idea been calculated and considered? Introducing even a well-known species to a new habitat is ecologically precarious; let alone placing a newly created hybrid elephant-mammoth into an ecosystem where neither elephants nor mammoths have ever lived. As Beth Shapiro writes in her book, *How to Clone a Woolly Mammoth*, there is a lot we don't understand about mammoth genetics.

What would these animals' quality of life be like? Would they be healthy and happy? How would other species be affected? How would we keep them safe from the hordes of curious people and poachers? And what would it mean for how we perceive biodiversity loss if we can just create animals that are similar to the ones we have lost?

Church's project, known as 'Revive and Restore', makes use of his Harvard University laboratory facilities and is privately funded. His laboratory has published papers on their embryological techniques, but despite regular media updates has yet to publish any full proposals on the wider ecological or societal implications of this particular application for review by the scientific community.

Without peer-reviewed papers or grant proposals, we don't know the all-important details surrounding animal welfare, biosafety and the impact on ecosystems and society of such a venture. The scientific community, regulators and policymakers should not have to find out about what scientists are doing by reading reports about their progress in the media.

But even before we ask detailed questions, we should go back and simply ask ... why?

Some big 'coulds' and 'mights'

Proponents of de-extinction believe it can be a way of restoring and rebalancing entire ecosystems and mitigating against further biodiversity loss. Church's project, for example, has broad goals far beyond resurrecting one iconic species. He writes: 'The goal of reanimation research is not to make perfect living copies

"But even before we ask detailed questions, we should go back and simply ask ... why?"

of extinct organisms, nor is it meant to be a one-off stunt in a laboratory or zoo. Reanimation is about leveraging the best of ancient and synthetic DNA. The goal is to adapt existing ecosystems to radical modern environmental changes, such as global warming, and possibly reverse those changes.

'A few dozen changes to the genome of a modern elephant – to give it subcutaneous fat, woolly hair and sebaceous glands – might suffice to create a variation that is functionally similar to the mammoth. Returning this keystone species to the tundras could stave off some effects of warming.'

In other words ... genetically modifying an elephant to give it fur and cold temperature-adapted blood might help us, in future projects, to make extant animals more resistant to sudden environmental change. Church and Zimov also believe that returning large herbivores to the Siberian tundra could help transform the landscape back into the ancient grassland it once was, sequestering carbon and preventing further melting of the permafrost there.

That's a pretty big 'might' and an even bigger 'could' ... should the procedure work, and the resulting genetic chimeras turn out to be born healthy and make it to adulthood, the creatures 'might' have an ecological function similar to a mammoth. Placing this species in the tundras 'might' help reverse global warming – if the population grows successfully, and the tundras return to an ancient grassland ecosystem that was last there 10,000 years ago (even though it will in fact be a completely invented species whose suitability in this frozen environment is entirely unknown).

Laudable aims, questionable execution

Aiming to 'adapt existing ecosystems to radical environmental changes' is admirable and important, but why must we attempt it by experimenting on elephants and mammoths, mammals that are highly social and intelligent? When did we agree, as a society, that humans should save species from extinction by changing how they look and function, in a laboratory?

It is also unclear why this long-extinct mammal in particular is required to make such an ecological transformation to the Siberian tundra. The mammoth was just one of many large herbivores that disappeared from the region – including woolly rhinoceroses, bison, horses, musk oxen, elk, saiga, yaks and others.

Church says his team has an independent ethicist working with them – but is that really enough oversight for such a controversial and potentially planet-changing procedure?

Extinction is an inevitable part of the natural world and creating a hybrid of one ancient species from 10,000 years ago does not mean our ecosystems have been returned to a more 'natural', 'pure' or balanced state. It could also distract from the ongoing mass extinction of modern species caused by human activity – why battle to save the habitat of this species or that, if we can just create more of them in the lab?

If this is about saving Asian elephants, by allowing them to live in colder climates, why the constant announcements that we

"Just because we can, doesn't mean we should"

are bringing woolly mammoths back to life? If we create one entirely new species – the elephant-mammoth hybrid – should we create others?

These are big, difficult topics and ethicists shouldn't be scrambling to debate them after the scientists have announced their latest breakthrough.

Genetic modification and experiments on animals have always been open to debate and distasteful to some – but we are currently in an era of unprecedented public understanding as to the benefits of this kind of bioscience. Animal research helps deliver safe medicines to market, synthetic biology could create new disease-fighting, fuel-producing or food-producing organisms, and gene editing could help us develop drought- and disease-resistant crops.

Elephant in the room

The creation of mutant animals for tenuous reasons is exactly what people originally feared about genetic engineering techniques. The first mammoth-elephant hybrid could become a big, hairy, lonely orange symbol of what happens when scientists modify organisms without proper oversight.

If researchers really think 'de-extinction' is a worthwhile avenue of research, they should surely focus their efforts on keystone species that are relevant to the world in which we live today.

Creating an odd biological chimera may well reawaken the spirit of the mammoth, but it will also reanimate the debate about whether scientists have 'gone too far' or are playing God. It could even bring the life sciences into disrepute. Just because we can, doesn't mean we should. ■

Further reading

Church G (2013). 'De-extinction is a Good Idea', *Scientific American*, <https://www.scientificamerican.com/article/george-church-de-extinction-is-a-good-idea>

Pleistocene Park – Restoration of the Mammoth Steppe Ecosystem, <http://www.pleistocenepark.ru/en>

Revive and Restore – George Church's project website, <http://reviverestore.org/projects/woolly-mammoth>

TEDx deextinction video collection, <http://reviverestore.org/events/tedxdeextinction/>

Help us fight the 'lost owner epidemic'



Become an NVD practice today

To become an NVD practice
Telephone: **0330 123 9924** or
Email: **enquiries@nvds.co.uk**



NATIONAL VETERINARY
DATA SERVICE
www.nvds.co.uk



Karen Wild
Dip App Psych CCAB

Karen is an ASAB-Certificated Clinical Animal Behaviourist with 20 years of experience in the field and runs a full-time behaviour practice, 'Pawprint', near Peterborough, working with family pets on a veterinary referral basis. She is a full member of the Association of Pet Behaviour Counsellors (APBC) and an Animal Behaviour and Training Council (ABTC) Registered Clinical Animal Behaviourist and Animal Training Instructor.

Karen has written three books: What your Dog Wants, 21 Days to the Perfect Dog and Being a Dog – all aimed at communicating welfare and training issues to the wider dog-owning public. She is resident behaviour and training feature writer for Dogs Today magazine as well as other UK and international pet titles.



*Suggested Personal & Professional Development (PPD)



BEHAVIOUR

More complex than 'home alone' – separation anxiety and isolation distress

The distress at being separated from 'familiar others' characterises the emotional condition often labelled as 'separation anxiety'. However, with thorough history taking, it is often not as simple as a cursory examination may first imply.

Whilst undoubtedly related to attachment to its 'significant others', a pet's routine is so representative of its coping behaviours that, prior to effective treatment, a very thorough diagnosis must be made. This should include details from the dog's early environment, its daily exercise and stimulation, its opportunity and ability to generalise its learning, and the individual relationships within its human and non-human family.

Separation distress issues require specific planning and are best suited to a clinician who has suitable behavioural experience. Referral to a full member of the Association of Pet Behaviour Counsellors and/or a Certificated Clinical Animal Behaviourist is advisable.

Aetiology and progression

Dogs are excellent 'associative learners' and this is an

important part of their natural adaptive behaviour. Anxieties develop as a dog learns and predicts situations that lead to threat or aversive events. It is usual to include separation distress within this category of more generalised anxiety disorders. However, it is often misleading because the label 'separation anxiety' implies a straightforward and linear cause.

As a social species, dogs require company in order to be able to express their normal behaviours. This varies widely between individuals, and across developmental stages. It is commonly assumed that the younger dog must experience more social contact, with an older dog requiring less – some symptoms of canine cognitive dysfunction can be misread as those of separation anxiety. The majority of dogs (55%), however, have onset of

separation-related distress before three years of age.

In the case of a separation distress response, the 'threat' cannot be escaped. The dog is left behind, unable to follow the owner – or other attachment target, which may be another pet – in order to alleviate feelings of anxiety (**Figure 1**). Thus the normal adaptive response is thwarted.

Pathophysiology includes adrenergic/noradrenergic overstimulation, leading to gastrointestinal upsets, diarrhoea and refusing food. This includes ignoring chews or treats left behind to 'occupy' the dog whilst the owner is absent. Increased heart rate, rapid panting, hypersalivation, restlessness and pacing are also common.

Specific signals

At what point this distress response becomes abnormal varies, often depending on the extent of the symptoms themselves.

Distress vocalisation

Distress vocalisation is commonly the point at which the behaviour becomes hard for owners to ignore. Indeed they may not be aware of the issue until neighbours report the noise, and the social impact of such events must be taken into account within the treatment plan.

Escape attempts

These usually occur at points of egress, with doors and surrounding trim, floors near exit points, windows including blinds and curtains, being damaged (**Figures 2 & 3**). Whilst



Figure 1. Separation distress can still arise even when the dog has a canine companion because the owner is their attachment object.



Figures 2 & 3. An example of damage to a door area.

expensive and upsetting for the owner, particularly in rented property, the safety of the animal must still be considered. Damage to teeth and claws can be apparent and must be checked for upon clinical examination.

Property of owners

Dogs may also damage familiarly scented items belonging to the owner, such as shoes or clothing. This activity is thought to be in part a consequence of self-comforting chewing behaviours rather than the more anthropomorphic view of “spite” or “revenge”, reported by some owners.

Self-inflicted trauma

Aside from damage caused by panic/attempts to reunite, the chronically stressed dog will lick and chew at forelimbs and occasionally chew flanks and other parts of its anatomy to the point of creating soreness and, in extreme cases, can persist as a self-perpetuating acral lick dermatitis.

Withdrawal and inactivity

In some cases, the dog may simply ‘give up’, becoming listless and disinterested, although the stress effects are still apparent.

Hypervigilance

This phenomenon occurs where the dog continuously follows the owner or checks on their whereabouts.

Aggressive behaviour

The dog will attempt to prevent the owner leaving, using aggressive behaviour – including lunging and biting. This can also occur when the owner attempts to put the dog into the area it normally occupies when the owner is out.

Contributing factors

It has been shown that a higher prevalence of separation distress is likely to occur in:

- dogs that are neutered
- dogs that were stray and/or have been re-homed
- dogs that have not attended formal training classes
- dogs whose owners are single.

Differential diagnoses

Since separation distress is specifically linked to absence of attachment figure(s) – they should be simple to identify, whether it is multiple family members, or whether it is the dog finding the experience of isolation aversive.

Video recording will assist with this process. However, it may be that daily disturbances – such as post arriving or other external noise – disturb the dog, causing it to panic, which may be unrelated to the separation issue. Boredom and lack of appropriate stimulation may lead to similar symptoms, particularly in a



Figure 4. Inappropriate elimination can occur in cases of dogs that panic when they are left alone.

young or highly active dog. Punishment by owners upon their return – perhaps for damage or inappropriate toileting – is a potential problem because this creates a significant anticipatory stress response.

Other potential factors include cognitive decline, pain, elimination as a result of being left for long periods or incomplete toilet training, incontinence, territorial marking, and any medical conditions (**Figure 4**). These should all be ruled out prior to referral.

History taking

The owner should be encouraged to report as many possible symptoms as possible; but this can be difficult.

It is easy for recording equipment to be left in place – mobile phone or web cameras and sound recording are well within the capability of most owners. They will give a clear timescale to the behaviours, especially as separation distress is said to peak within the first half an hour of the attachment figure leaving the property.

Specific areas that must be discussed are:

- members of the household and their relationship with the dog – this includes all pets
- daily routine, including exercise and stimulation, as well as feeding schedules

Look for:

- physical and mental health needs being met
- length of time the dog is left alone
- who provides the biggest ‘resources’ in terms of time spent looking after the dog
- does the dog show a distinct preference?

Where the dog is left, look for:

- is the dog enclosed in a small space, causing it to feel trapped?
- does the dog fear entry to this area?
- is the area comfortable and away from external disturbance?
- is the area safe should the dog attempt to escape? Barriers are a clear trigger for frustration behaviours and escalation of distress as the dog fails to achieve its goal of reunification (**Figure 5**).



Figure 5. Dogs will damage barriers in an attempt to reunite with owners.



Figure 6. Overenthusiastic greetings are common amongst dogs experiencing separation distress.



Figure 7. Dogs will often need extra stimulation as a means to boost mood, especially prior to being left. [Photo: John Guillain].



Figure 8. Training the dog to remain in a safe haven can take time and owners must remain nearby at first.

Excessive departure and greeting routines

Owners may spend time fussing the dog and perhaps telling it to “be good” as they leave; which becomes another simple predictor that an absence is about to occur. In addition, upon their return, an effusive greeting can create high arousal upon anticipation (**Figure 6**).

Does the dog behave similarly in other locations or when other family members leave or remain present?

Look for:

- other sensitisation or sensitivities, such as noise phobias, because these will need separate identification and treatment.

Examine the habits formed by the dog, such as spending time on landings or window sills and other vantage points to the outdoors. Vocalisation can be the result of excitement from seeing passers-by or other visual stimuli. It is possible that the dog sees this as part of their daily stimulation but will compound any noise nuisance and can also lead to further location-guarding issues.

Treatment Immediate measures

Ideally, the dog should no longer be left alone in the same situation. This can be difficult to arrange but is strongly advised. Day care, dog-sitting, bringing the dog to stay with family or even temporarily arranging it to come to the workplace are all options.

Plenty of stimulation should be introduced on a daily basis through walks, play and training – exercising the dog before periods of its being left is essential (**Figure 7**). The dog’s natural homeostasis must be maintained by following all health guidelines, including good nutrition.

Providing activity – such as high-value food puzzles – whilst the owners are absent, and ensuring the dog is hungry and tired prior to being left are both useful adjunctive measures.

Specific behaviour modification

Depending on the history, it is likely that the dog will require specific desensitisation and counter-conditioning to the

variety of triggers that have been identified – for example, keys being picked up, shoes put on, coats donned. These must be listed and repeated at intervals, preferably whilst the dog is relaxing in its ‘haven’; but also to ensure that they no longer only predict that the dog is likely to be left alone.

Whilst departures are still inevitable, by counter-conditioning deliberate safety and relaxation in a location that provides comfort, the impact and arousal is diminished. Make certain that the departures and arrivals of the family are low-key too.

The dog should be taught to go to a ‘safe haven’, which may be different to the place it has been left previously (**Figure 8**). This is simply taught by leaving the dog’s feeding and water bowls in the new location. The owner can teach the dog to go there

on cue by offering a food tidbit and luring it to the location.

A specific ‘stay sequence’ can be taught with the help of a qualified dog trainer. This is to accustom the dog to staying in its haven without feeling the need to move, and being reinforced for remaining there, calmly, until the owner returns.

Reduce opportunities for the dog to ‘shadow’ the owner – rather than simply closing barriers, using the stay sequence above gives the dog a comfortable and safe place in which to locate and to remain.

Redistribution of care amongst family members will help to reduce the attachment level. Care must be taken, however, not to overemphasise any other members, since the problem will re-emerge with a different attachment figure.

“As a social species, dogs require company in order to be able to express their normal behaviours”

Protocols for departure cues and relaxation training can be found in Overall (2013) or can be designed with the specific dog in mind. Each trigger should be listed and then worked with from the simplest exposure (for example, simply asking the dog to go to its safe place and stepping away briefly, then returning), extending to more difficult (leaving the dog for gradually longer periods).

The dog should never show signs of anxiety during this protocol work. The goal is to only introduce one criterion at a time – duration, distraction type (keys or shoes, for example), time of day, and so on. At each point the dog is rewarded with food for remaining calm and relaxed.

In time, it is often the case that the dog will seek out the safe location whenever it feels distressed as it learns to seek comfort and safety in that location rather than only relying on the owner to provide this (**Figure 9**).

Medication and other interventions

Medication is advised only in conjunction with behaviour modification. This includes non-prescription pheromonal and nutraceutical products.

Specifically, clomipramine has been approved for use in dogs with separation anxiety; however, all contraindications must be considered and discussed with the clinical animal behaviourist prior to commencement. This is particularly the case in situations where aggressive behaviour is manifest, because the potential disinhibitory effects of some medications can increase risk to the surrounding family. ■



Figure 9. Dogs should be taught to relax alone in a safe haven from a very young age.

PPD Questions

1. Why might the label 'separation anxiety' be misleading when diagnosing this issue?
2. If a dog cares so much about its owner, for what reason might a dog develop aggressive responses toward them when this person is attempting to leave?
3. List four contributing factors leading to a higher prevalence of separation distress in dogs
4. Why should behaviour referral be sought in more severe cases, especially when medication may be decided upon as part of treatment?

Answers

1. Anxiety conditions are not relevant to this diagnosis; the behaviour is not linked to separation from an attachment figure; the dog may suffer distress linked to being isolated rather than simply separated from an attachment figure

2. The dog is highly aroused and will aim for the nearest target; is guarding the door; does not want the attachment figure to leave and will escalate behaviour to prevent this

3. See under 'Contributing factors'

4. Medication is not shown to be effective and should not be considered; behavioural intervention does not work without drug treatment; some medications can disinhibit behaviours, such as aggression, which would previously be under the animal's self control, leading to escalated intensity.

References

Appleby D and Pluijmakers J (2003). 'Separation anxiety in dogs: the function of homeostasis in its development and treatment' *Veterinary Clinics of North America: Small Animal Practice* 33(2): 321-344.

Flannigan G and Dodman N (2001). 'Risk factors and behaviors associated with separation anxiety in dogs.' *Journal of the American Veterinary Medical Association* 219(4): 460-466.

Horowitz DF (2012). 'Separation-related problems in dogs and cats' in Horowitz DF and Mills DS (eds) *BSAVA Manual of Canine and Feline Behavioural Medicine*. Gloucester pp 146-158.

Overall K (2013). *Manual of Clinical Behavioral Medicine for Dogs and Cats*. Elsevier Health Sciences.

Sherman BL and Mills DS (2008). 'Canine anxieties and phobias: an update on separation anxiety and noise aversions.' *Veterinary Clinics of North America: Small Animal Practice* 38(5): 1081-1106.



Rachael Smith
DVM MRCVS

After completing a rotating internship, Rachael joined the Vets Now 'Cutting Edge' programme and worked for two years in busy out-of-hours clinics. She will shortly be starting a residency in emergency and critical care at the Royal Veterinary College, London.



Shailen Jasani
MA VetMB DipACVECC MRCVS

Shailen has spent the last 15 years working in emergency and critical care. He is the founder of The Ralph, a new multidisciplinary small animal specialist referral hospital in the south-east of England expected to open in 2018, which will include both a referral ECC service and a primary care out-of-hours service.



**Suggested Personal & Professional Development (PPD)*



CRITICAL CARE

A practical approach to the emergency patient

Managing an emergency patient with life-threatening illness or injury can be challenging. However, these rewarding cases provide us with the opportunity to do what motivated many of us to become veterinary surgeons in the first place – to relieve suffering and save lives.

The majority of consultations in first-opinion practice have a linear and diagnosis-driven structure. Emergency patients, presenting with life-threatening illness or injury, require a different approach – the primary goal being to stabilise major body systems and rapidly relieve pain.

Preparation for the emergency patient

We are not always given the chance to prepare for the arrival of an emergency patient; but in situations where the client has initiated contact before arriving at the clinic, every effort should be made to prepare.

So, gather the clinical team, share the details of the case – including any immediate interventions that may be needed – and prepare for the patient's arrival by setting up equipment that is likely to be required. This may be an appropriate time to discuss the likely sequence of events and everyone's individual responsibilities once the patient has arrived.

After preparing for the patient's arrival, whenever possible, work together to check all inpatients are stable, clean and comfortable, and that any required medications have been administered. The addition of critical alert values to the hospital sheets of unstable inpatients will provide the nursing team with increased clarity and ensure concerns are communicated – for example, “*monitor respiratory rate, if >40 breaths per minute or increased effort alert vet*”.



“Emergency patients, presenting with life-threatening illness or injury, require a different approach...”

Preparation and clear communication between clinical team members will ensure that attention can be given to emergency patients without compromising inpatient care.

Veterinary surgeons and nurses often prioritise patient well-being before their own; although admirable, this selflessness can potentially result in substandard care and mistakes being made. A dehydrated vet and a hypoglycaemic nurse are unlikely to be performing at their very best; so, when possible, team members should rehydrate and refuel before the arrival of an emergency patient.

Primary survey

The ‘primary survey’ or ‘major body systems’ assessment is performed to rule out derangements to the respiratory, cardiovascular

and central nervous systems; because, regardless of the illness or injury, all patients will ultimately die as the consequence of failure of one of these three systems. A pain assessment is also included in the primary survey, so that appropriate analgesia can be provided immediately, if necessary.

Once the primary survey has been completed and patient stabilisation initiated, a complete physical examination (‘secondary survey’) should be performed.

Respiratory system evaluation

Patients with dyspnoea, particularly cats, will be significantly stressed by transportation to the clinic and, as such, may be at their most vulnerable shortly after arrival – even gentle restraint can result in decompensation and respiratory/cardiac arrest.

Perfusion Parameter	Mild hypovolaemia Compensatory	Moderate hypovolaemia Early decompensatory	Severe hypovolaemia Late decompensatory
Heart rate	120-150 bpm	150-170 bpm	170-220 bpm
Femoral pulse	bounding, snappy	weak	very weak or thready
Dorsal pedal pulse	readily palpable	just palpable	not palpable
Mucous membrane colour	normal, pinker	pale pink	very pale/white
Capillary refill time	< 1 sec	1-2 secs	> 2 secs or not detectable
Mentation	usually normal	depressed	severely depressed
Extremities	usually normal	cool (or normal)	cold

Table 1. Physical examination parameters consistent with hypovolaemic shock in dogs

Perfusion Parameter	
Heart rate	'Inappropriate' bradycardia – heart rate 120-160 bpm
Pulse quality	weak or absent pulses
Mucous membrane colour	pale
Capillary refill time	prolonged (> 2.5 secs) or undetectable
Mentation	depressed
Temperature	cold extremities, hypothermia

Table 2. Physical examination parameters consistent with hypovolaemic shock in cats

For many of these patients, the risk of immediately performing a physical examination or diagnostic investigations far outweighs the benefit. Therefore, in order to do no harm, we must sometimes do very little.

Supplementing oxygen, reducing anxiety by providing a calm environment and administering appropriate sedation is often the best way to improve the patient's immediate situation. Usually, with oxygen therapy and stress reduction, the patient's clinical signs will improve enough to allow the primary survey to be completed safely.

Point of care (POC) thoracic ultrasound based on the T-FAST (thoracic-focused assessment with sonography for trauma) protocol can be performed to identify pleural effusion, pulmonary oedema

and pneumothorax, without the need to move or restrain the patient – even clipping of fur is often not needed.

Veterinary surgeons with limited ultrasound experience should not be discouraged from attempting to perform POC ultrasound – it is non-invasive and of relatively low risk to the patient. If pleural effusion or pneumothorax is suspected or diagnosed, then thoracocentesis should be performed.

Thoracocentesis is both a diagnostic and therapeutic intervention that is usually well tolerated by non-sedated patients and it can be life saving. The risk-benefit profile of performing radiographs in dyspnoeic patients should be considered carefully as the risk of restraint and handling causing respiratory decompensation is high.

Cardiovascular system evaluation

Evaluation of the cardiovascular system focuses on identifying poor systemic tissue perfusion, resulting in decreased tissue oxygen delivery and shock. Shock can be classified in a number of ways and a common means of classification refers to four main categories: hypovolaemic, distributive, cardiogenic and obstructive shock. Hypovolaemic shock is the most common form seen in veterinary medicine.

Systemic perfusion is assessed by evaluating the patient's physical perfusion parameters, which include heart rate, pulse quality, mucous membrane colour and capillary refill time. In addition, mentation and temperature are less sensitive but nonetheless useful.

Hypovolaemic dogs in compensated shock may present with a hyperdynamic clinical picture and subtle changes to perfusion parameters before progressing to a hypodynamic

picture and decompensatory shock (**Table 1**).

In contrast, the classic presentation for the hypoperfused cat is a hypodynamic picture and this is considered a life-threatening problem – the hyperdynamic picture observed in dogs is rarely seen in cats (**Table 2**).

For all forms of shock – except cardiogenic – the mainstay of treatment involves rapid vascular access and intravenous fluid therapy (Silverstein & Hopper, 2015). Aggressive fluid therapy has the potential to harm patients with cardiogenic shock. Thankfully, cardiogenic shock is relatively uncommon and the patient's signalment can help to raise the index of suspicion – consider cardiogenic shock owing to severe dilated cardiomyopathy in a Great Dane, for instance.

Cardiogenic shock can usually be excluded by combining careful cardiac auscultation for moderate-to-severe murmurs or dysrhythmias with concurrent pulse palpation

"...in situations where the client has initiated contact before arriving at the clinic, every effort should be made to prepare"

	First bolus* (ml/kg)	Anticipated total volume** (ml/kg)		
Severity of hypovolaemia		Mild	Moderate	Severe
Dogs	10-40	20-40	40-60	60-90
Cats	5-20	10-20	20-40	40-60

* First bolus usually given over 15-20 minutes

** Anticipated total resuscitative fluid volume usually given within first hour

Table 3. Intravenous bolus fluid resuscitation

looking for significant pulse deficits. If concern remains and time allows, POC cardiac ultrasound and/or electrocardiography (ECG) may also be performed.

Dogs are unlikely to have a physiological sinus heart rate of >240 bpm and cats >300 bpm; so have a high index of suspicion for tachydysrhythmias in severely tachycardic patients and perform an ECG. Pericardial effusion is a classic cause of obstructive shock and should be suspected in a patient with a suggestive signalment and muffled heart sounds – the diagnosis can be confirmed by a brief ultrasound examination requiring little experience or skill.

Resuscitative fluid therapy can begin once cardiogenic shock has been ruled out to the best of one's ability – patients in shock will also benefit from oxygen supplementation until perfusion has been improved. The approach to fluid therapy for patients in shock is completely different to fluid therapy for dehydrated patients. Animals in shock require bolus fluid therapy administered over 15-20 minutes to rapidly expand the intravascular space and increase perfusion; dehydrated animals require restoration of the extravascular fluid volume over 12-48hrs.

In practice, fluid resuscitation should be tailored to the individual patient – placing the animal on 'shock rate fluids'

does not represent a tailored approach. Consider fluid resuscitation in the same way as drug administration: decide a fluid bolus dose, administer over 15-20 minutes and then assess and record the patient's response (**Table 3**).

Repeat as necessary until end points of resuscitation have been reached – until perfusion parameters have stabilised at, or close to, normal.

Patients with ongoing fluid losses may deteriorate after initial fluid resuscitation and re-enter a state of shock, so regular reassessment of perfusion parameters is essential to detect the early changes to perfusion parameters before the patient decompensates. Patients who do not respond to fluid resuscitation – and have received the anticipated total fluid volume within the first hour – may require inopressor support (beyond the scope of this article).

Central nervous system

Primary survey evaluation of the central nervous system does not involve performing a complete neurological exam – the goal is to identify if any of the following conditions are present:

- altered mentation
- seizures
- spinal cord injury requiring immobilisation.

Mildly-to-moderately reduced mentation may be the consequence of primary factors, such as

shock, hypothermia, pain or hypoglycaemia. Increased intracranial pressure should be suspected in all patients presenting with severely reduced mentation – especially after head trauma or with a history consistent with cerebral abnormalities, or in whom mentation does not improve as expected after primary factors affecting mentation, such as those already listed have been addressed.

In particular, veterinary surgeons should be aware of the Cushing's Response, which occurs as a late change in patients with increased intracranial pressure and

signals impending herniation through the foramen magnum. The Cushing's Response consists of systemic hypertension and bradycardia.

Analgesia

All veterinary practices that may see animals in moderate to severe pain should have a full (pure) μ -agonist opioid available – in the UK, methadone has now been licensed for use in dogs and cats. These agents are extremely affordable, highly effective, have a rapid onset of action (<5 minutes) and allow dose titration to effect. Regardless of the route of administration, buprenorphine has a

"A dehydrated vet and a hypoglycaemic nurse are unlikely to be performing at their very best..."





significantly slower onset of action (20-45 minutes) than pure opioids; so it is, therefore, less than ideal as an initial analgesic in painful patients. If buprenorphine has already been given, pure opioids may still be effective without waiting for the traditionally stated four to six hours.

A full discussion is beyond the scope of this article but readers are reminded to include safe multimodal analgesia where possible. Non-steroidal anti-inflammatory agents (NSAIDs) are often contraindicated initially in emergency patients, owing to the presence of poor systemic perfusion.

Reflection

Reflecting back on emergency cases as a team is vitally important if we want to learn and improve. Remember to perform this reflection in a positive and constructive way – for example, by asking “What went well and what could be even better?” This will ensure that emergency and critical care (ECC) teams build a supportive, nurturing environment which is conducive to learning. ■

PPD Questions

1. The ‘primary survey’ involves evaluation of which body systems?
 - A. central nervous system, urogenital system, respiratory system
 - B. respiratory system, cardiovascular system, central nervous system
 - C. cardiovascular system, gastrointestinal system, skeletal system
 - D. all body systems
2. Which type of shock is most commonly seen in veterinary practice?
 - A. distributive
 - B. hypovolaemic
 - C. cardiogenic
 - D. obstructive
3. Feline patients in shock typically present in compensatory shock.
 - A. true
 - B. false

Answers
1. B 2. B 3. B

References

Silverstein DC and Hopper K (2015). *Small Animal Critical Care Medicine*. (2nd edn) Elsevier Saunders p4.



Val Strong
MSc

After qualifying as a medical scientist, Val pursued a career in animal behaviour and training, gaining her MSc in Companion Animal Behaviour Counselling from the University of Southampton – studying the effects of diet on canine behaviour and training.

Val developed the first puppy socialisation classes in South Yorkshire, went on to found the charity, Support Dogs, and is well known for her work with assistance dogs – especially their training for people with epilepsy and other complex medical conditions. She has many years of experience in rehabilitating problem dogs and horses, has written a number of booklets, and heads a behaviour practice in the north of England.

Val lives in a small rural hamlet on the outskirts of Sheffield with her husband, Border terrier and several traditional Dales ponies.



*Suggested Personal & Professional Development (PPD)



BEHAVIOUR

Effect of dietary amino acid content on canine learning and behaviour

It has been shown in humans and other species that some amino acids in the diet directly influence brain activity by enhancing or reducing the rate of synthesis of different neurotransmitters. The level of tryptophan – and other large neutral amino acids provided in the diet – can influence the brain concentrations of these amino acids and subsequently alter behaviour.

Mammals are unable to synthesise tryptophan and, therefore, levels in the brain depend on the presence of adequate dietary concentrations. Tryptophan is converted in the terminals of certain neurons into the indolamine serotonin, one of the monoamine neurotransmitters; the synthesis of serotonin has been shown to be influenced by the levels of the B-group vitamins and insulin secretion.

Serotonin has been shown to act as a mood stabiliser and its deficiency has been implicated in learning difficulties, reinforcement contingencies and in a number of affective disorders. Therefore a diet that significantly increases levels of serotonin in the brain may have an important role in the treatment of canine behaviour and training problems.

Nutritional perspective and effects

Appropriate nutrition requires that all nutrients, carbohydrates, lipids, proteins, minerals, vitamins and water are ingested in adequate amounts and in the correct proportions to the energy content of the food. This is essential for normal organ development and function, reproduction, repair of body tissues and combating stress and disease. The nutrient intake must also be adjusted for varied levels of activity and physical work.

Ingested protein is broken down into its component



Figure 1. It has been shown in humans and other species that certain amino acids directly influence brain activity and behaviour.

amino acids. It is well known that the amino acids tryptophan and tyrosine are converted to neurotransmitters in the mammalian brain. Tyrosine is converted to the catecholamine stimulants adrenaline, dopamine and noradrenaline; while tryptophan is converted to the indolamine serotonin.

Noradrenaline induces high states of arousal and has been implicated in the generation of aggression. Dopaminergic pathways in the brain are concentrated in the basal ganglia region and are involved in motor co-ordination, attention, reinforcement and reaction time. The indolamine, serotonin, was first discovered in 1948. Since then, a rather extensive network of serotonergic neurons has been identified in the mammalian brain, which originate within

the raphe-nuclei region situated in the brain stem.

At most synapses, serotonin produces inhibitory post-synaptic potentials, and its behavioural effects are also generally inhibitory (Carlson, 1994). Serotonin plays a role in the regulation of mood, the control of sleep and arousal, the regulation of pain and in the control of eating. Low serotonin levels have also been implicated in alcoholism, obsessive compulsive disorders and other reward deficiency syndromes, such as impulsivity, violent behaviour, suicidality, anti-social behaviour and attention deficit hyperactivity disorder (Vander et al, 1994); (Linnoila & Virkkunen, 1992).

It has been shown in humans and other species that certain amino acids directly influence brain activity and behaviour by enhancing or reducing the

rate of synthesis of various neurotransmitters (**Figure 1**). The ratio of the concentration of the large neutral amino acids – tryptophan (**Figure 2**), tyrosine, leucine, isoleucine, valine and phenylalanine – in the diet can significantly affect the biosynthesis of the groups of neurotransmitters known as the monoamines, which play a pivotal role in the regulation of arousal states.

Control and competition

The concentration of an amino acid in the diet or in the blood does not directly reflect its level in the brain. A complex group of blood-brain barrier mechanisms closely controls both the kinds of substances that enter the extracellular fluid of the brain and the rate at which they enter. Amino acids, amongst other important substrates, use an active transport mechanism, combining with transport proteins to cross the blood/brain barrier.

For amino acids, these carrier mechanisms are both size and charge specific. Within each carrier group, individual amino acids compete for uptake. Hence, an event such as meal ingestion can influence the level in the brain of a given amino acid by modifying its concentration in the blood and/or the blood concentration of other amino acids that compete with it for uptake. Therefore, the ratio of tyrosine or tryptophan to the sum of the other large neutral amino acids in the circulation will effectively control the amount of the amino acid taken across the blood-brain barrier.

The amount of tryptophan entering the brain depends primarily on the ratio of the plasma tryptophan concentration to the sum of the plasma concentrations of the other large neutral amino acids – leucine, isoleucine, valine, phenylalanine and tyrosine (Eastwood, 1997); (Growdon & Wurtman, 1976).

This significant correlation between the serum levels of individual amino acids and their ratio to the sum of other transport competitors supports the theory that competition between tryptophan and other large neutral amino acids is very important and is a dominant determinant of tryptophan uptake into the brain (Vander et al, 1994).

Tryptophan in foods

Tryptophan is present in relatively low amounts in high protein foods compared to other large neutral amino acids, such as tyrosine. Therefore, when a meal that contains a high concentration of protein is ingested, tyrosine gains a competitive edge for entry into the brain. Conversely, following a high carbohydrate load, tryptophan enters the brain; although Fernstrom and Fernstrom (1965) state that brain tryptophan can only be raised by carbohydrate intake if the carbohydrate meal is given within two to three hours of protein ingestion.

Serotonin in the brain is synthesised from tryptophan; but, the rate-limiting step is hydroxylation of tryptophan to 5-hydroxytryptophan via tryptophan hydroxylase. This is then converted to serotonin by aromatic L-amino acid decarboxylase (Fernstrom, 1983). Tryptophan hydroxylase is a low affinity enzyme – a molecule of tryptophan and a molecule of the enzyme have no strong inclination to bind. Therefore, it is only when the concentration of tryptophan is much higher than normal that the enzyme can function at its maximum rate (Fernstrom & Wurtman, 1983).

Amongst their other various functions, the B-group vitamins maintain the functional integrity of the mammalian nervous system. The enzymes involved in serotonin synthesis are B₆ and

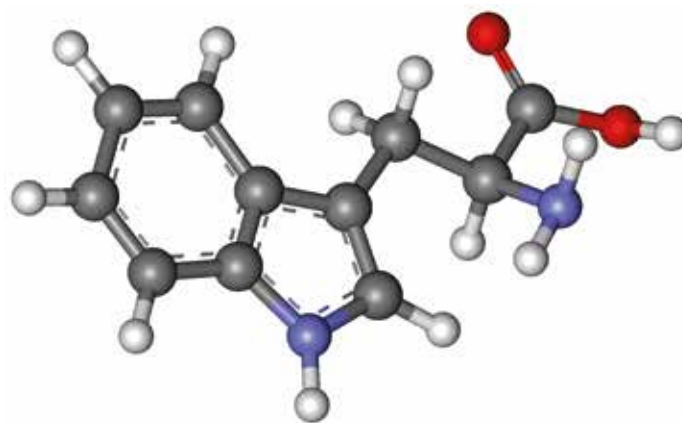


Figure 2. A molecular structural model of the amino acid, tryptophan. (Image credit: Marina Vladivostok)

riboflavin-dependent, as these act as co-factors, particularly in decarboxylation reactions (Growdon & Wurtman, 1976). As the B-group vitamins are water soluble, an adequate concentration needs to be provided in the diet on a daily basis.

Neurochemistry of learning

Animals have evolved to learn through reinforcing events (Gray, 1987). However, if the brain's reinforcement mechanisms are impaired, then the ability to experience reinforcing events will be reduced and learning affected accordingly. In fact, if an individual has a biochemical inability to derive reward from ordinary everyday activities, then behavioural problems – such as addictive, compulsive or impulse control disorders – may result (Blum et al, 1996).

Dopamine is the primary neurotransmitter of reward in the limbic system, but at least three other neurotransmitters are known to be involved: serotonin, the enkephalins and gamma aminobutyric acid. In a normal individual, these neurotransmitters work together in a cascade of excitation or inhibition leading to a feeling of well-being, the ultimate reward (Blum & Kozlowski, 1990).

A disruption of these intracellular interactions

results in anger, anxiety and other “negative feelings”, or in a craving for substances that alleviate these negative emotions. Prolonged stress can lead to a self-sustaining pattern of abnormal cravings in both animals and humans. Research on alcoholic rats (McBride et al, 1990) shows that the increase of supply of serotonin at the synapse will reduce craving for alcohol.

The biological substrates of reward are the basis for impulsive, compulsive and addictive disorders, comprising the reward deficiency syndrome. The reward circuitry for habit-forming behaviours is the same as that for natural rewards.

The reward cascade begins with the excitatory activity of serotonin releasing neurons in the hypothalamus. This then causes the release of the opioid peptide, met-enkephalin in the ventral tegmental area, which inhibits the activity of neurons that release the inhibitory neurotransmitter gamma amino butyric acid. The disinhibition of dopamine containing neurons in the ventral tegmental area allows them to release dopamine in the nucleus accumbens and in certain parts of the hippocampus, completing the cascade and mediating reinforcement effects.

Learning involves the strengthening of the connections between neural circuits that detect a stimulus and neural circuits that produce a particular response. An inability to experience reinforcing events – be they positive or negative – will lead to reduced learning capabilities and associated behaviour problems.

A combination of genetic and environmental factors can affect an animal's ability to cope with novel situations and learning tasks (Baumeister et al, 1994). The secretion of hormones, such as the corticosteroids, through dysregulation of the hypothalamic pituitary adrenal axis, in response to prolonged stress, can reduce brain levels of serotonin (Koob & LeMoal, 1997). This explains the many abnormal behaviour patterns sometimes seen in dogs in rescue shelters (Fisher, 1990).

Serotonin, gamma amino butyric acid, glutamate, dopamine and opioid systems have been shown to be involved in mediating positive reinforcement systems (Koob & LeMoal, 1997), and a deficiency in the reward cascade causing lowered levels of serotonin can lead to negative states, such as depressed mood, dysphoria, irritability, and impulsive behaviour via a reduction of the behavioural inhibition system during learning.

Emotion versus mood

All human and animal behaviour is influenced by moods and emotions, both of which affect each other (Panksepp, 2005).

Emotions involve a relationship between the individual and an explicit cause/object/event. Emotions are acute, and short-lived, lasting milliseconds, or minutes at most. The cause that elicits an emotion (the stimulus)

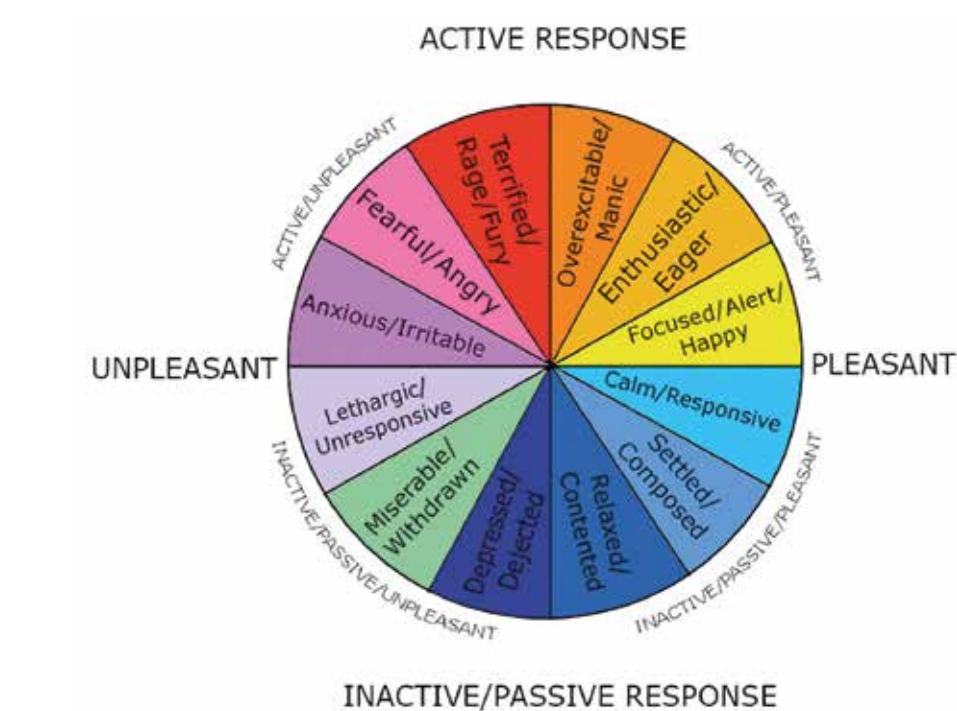


Figure 3. Using the PANAS model, emotional states can be plotted on a two-dimensional grid.

Anxiety/agitated/ Unable to settle	10	9	8	7	6	5	4	3	2	1	Calm/ relaxed
Before											
Week 1											
Week 2											
Week 3											
Reactivity/low impulse control	10	9	8	7	6	5	4	3	2	1	Composed/ responsive
Before											
Week 1											
Week 2											
Week 3											

10 = an intense negative emotional state and low positive emotional state; 1 = an intense positive emotional state and low negative emotional state.

Table 1. Form for the assessment of emotional state/response within a kennelled environment

can be anything from an event in the environment to individual thoughts and memories (Ekman, 1994). In contrast, moods last for hours or even for several days (Beedie, 2005).

Moods are not directed at a particular object or cause, but rather are a culmination of similar experiences. Consequently, we are

generally unable to specify the cause of a particular mood (Ekman, 1994). Mood is the background feeling of the day, how the animal feels and behaves generally when not displaying the problem behaviour. A depressed dog will be much more difficult to motivate and an overexcited dog is unlikely to be able learn to focus and be calm when meeting people.

Behaviour problems are not diseases. Successful treatment depends upon accurate assessments of how the animal feels – fearful, angry, for example – at the time the problem behaviour occurs and the animal's general mood state.

Assessment tools

When describing emotional states, the term often used is

'affect', meaning the experience of feeling or emotion. In 1988, Watson et al (1988) published a paper introducing the Positive and Negative Affect Schedule (PANAS), based on the idea that positive and negative affect should be separately tracked because they vary independently.

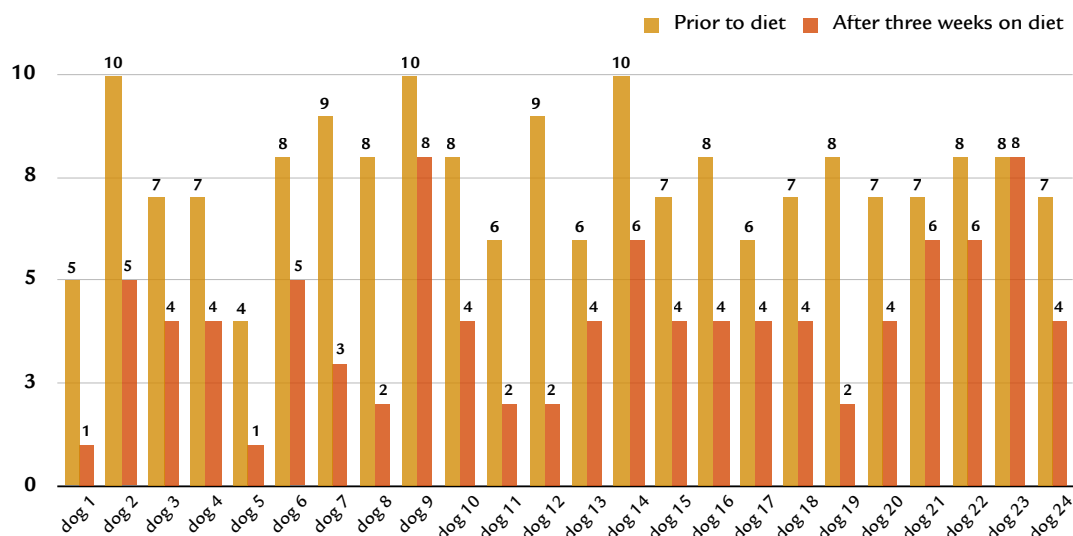
Using the PANAS model, emotional states can be plotted on a two-dimensional grid. On the x-axis "pleasantness/unpleasantness," on the y-axis "arousal," or "activation" and emotional states are placed around these axes (**Figure 3**).

Active-pleasant emotional states are those of excitement and pleasurable engagement, while misery and lethargy are the opposite passive-unpleasant states. The active-unpleasant emotional states are those of distress or irritation and non-pleasurable engagement and include anxiety, fear, and terror as well as irritability, anger and rage. Passive-pleasant states are those of calmness and contentment.

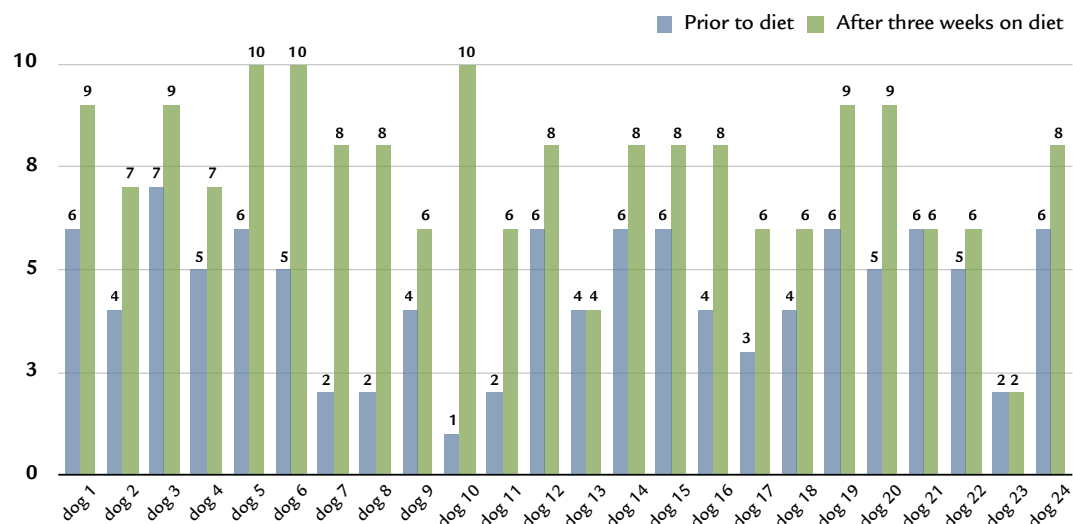
Inability to express or engage in innate motor patterns may result in a lowered mood state, provoking intense emotional responses to various stimuli. Irrelevant behaviour patterns, displacement activities or coping strategies, such as scratching or barking, may be exhibited in response to the frustration of intermittent reinforcement (Fisher, 1990).

Inadequate or ineffective reinforcement may elicit adjunctive behaviours, such as drinking or redirected aggression (Blum et al, 1996) or a hyperactivity state caused by the arousal of the noradrenergic pathways. Low levels of serotonin have been associated with high locomotor responses, especially in response to novel situations such as change in surroundings in a rescue shelter.

Anxiety/agitated



Calm/relaxed



Figures 4 & 5. The behavioural effects of feeding a serotonin-enhancing diet.

The assessment of emotional state/response can provide an accurate measure of behavioural response within kennel environments. Scores are given to all relevant emotional states to provide a validated scale of assessment. Scores of 1 to 10 indicate the observer's objective evaluation of the intensity of the dog's emotional state (**Table 1**).

Behavioural evidence

The author has formulated a serotonin-enhancing diet* that uses insulin – secreted in response to carbohydrate ingestion – to regulate plasma

glucose levels and divert other large neutral amino acids to peripheral skeletal tissues, where they are involved in energetic and immune system pathways; thereby enabling tryptophan to gain a competitive edge across the blood brain barrier.

A feeding study was carried out at Wood Green, The Animals Charity, involving 38 dogs of various breeds/type. Their average time in kennels was 58 days. Inclusion into the study required the dogs to be in good health, with no history of dietary intolerance,

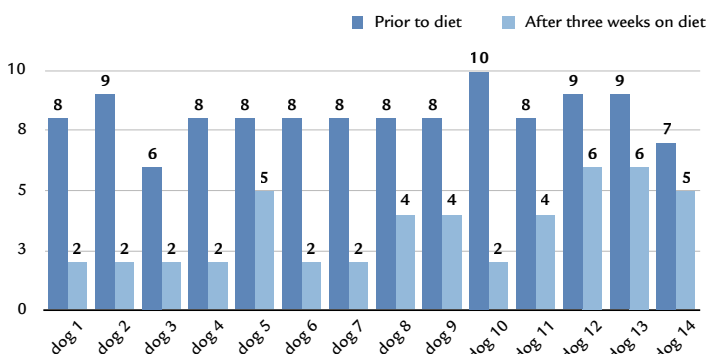
not receiving any veterinary treatment or medication, or any remedial behaviour therapy.

Two aspects of common problem behaviour within a kennel environment were studied:

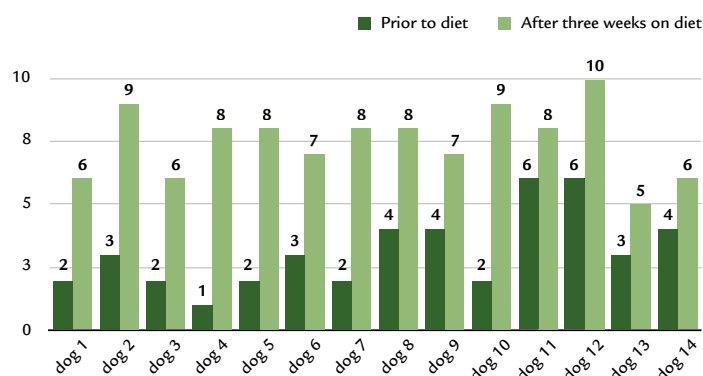
- Group 1 (24 dogs) anxiety/agitation/inability to settle versus calm/relaxed
- Group 2 (14 dogs) reactivity/low impulse control versus composed/responsive

Behaviour was assessed prior to entering the study (week 0), and at weeks 1, 2 and 3 of the study period.

Reactivity/low impulse control



Composed/responsive



Figures 6 & 7. Additional behavioural effects of feeding a serotonin-enhancing diet.

Although not one of the outcome measures, several dogs were able to be moved into the rehoming kennels part way through the trial.

Of the dogs in Group 1, Dog 23 made no improvement on the diet. Of the remaining 23 dogs, there was an average 53 per cent reduction in anxiety and agitation with a comparable 61 per cent improvement in calm/relaxed behaviour (Figures 4 & 5).

In all 14 dogs in Group 2, there was an average 55 per cent reduction in reactivity with a comparable 59 per cent improvement in composed/responsive behaviour (Figures 6 & 7).

Conclusions

Rescue kennels are stressful environments for most dogs. These preliminary results suggest that a serotonin-enhancing diet can have a positive effect on dogs' mood state and emotional responses, and their ability to respond to training. This, in turn, can have a positive effect on the welfare and management of dogs in rescue shelters and their successful rehoming. ■

* For further information visit www.breakthroughdog.co.uk or contact the author at valstrong@sky.com

References

- Baumeister RF et al (1994). *Losing Control; How and Why People Fail at Self Regulation* (eds) Academic Press.
- Beedie CJ et al (2005). Distinctions between emotion and mood. *Cognition & Emotion*, 19(6): 847-878.
- Blum K and Kozlowski GP (1990). Ethanol and neuromodulator interactions: a cascade model of reward. *Progress in Alcohol Research* 2: 131-149.
- Blum K et al (1996). Reward Deficiency Syndrome. *American Scientist* 84,132-145.
- Carlson NR (1994). *Physiology of behaviour* (5th edn). Allyn & Bacon.
- Eastwood M (1997). *Principles of Human Nutrition*. Chapman and Hall.
- Ekman P (1994). Moods, emotions, and traits. In Ekman P and Davidson RJ (eds.), *The Nature of Emotion, fundamental questions* pp. 56-58. Oxford University Press.
- Fernstrom MH and Fernstrom JD (1965). Brain tryptophan concentrations and serotonin synthesis remain responsive to food consumption after the ingestion of sequential meals. *Am J Clin Nutrition*, 61: 321-319.
- Fernstrom ID and Wurtman RJ (1974). Nutrition and the Brain. *Scientific American* 1230(2): 84-91.
- Fernstrom JD (1983). Role of precursor availability in control of monoamine biosynthesis in the brain. *Physiological Reviews* 63.
- Fisher J (1990). *Think Dog!* HP & G Witherby Ltd.
- Gray JA (1987). *The psychology of fear and stress* (2nd edn) Cambridge University Press.
- Growdon JH and Wurtman RJ (1976). Dietary influences on the synthesis of neurotransmitters in the brain. *Nutrition Reviews* 37(5): 129-136.
- Koob GF and LeMoal M (1997). Drug Abuse: Hedonic Homeostatic Dysregulation. *Science* 278: 52-58.
- Linnoila VMI and Virkkunen M (1992). Aggression, Suicidality and Serotonin. *J Clin Psychiatry* 53: 46-51.
- McBride WJ et al (1990). Regional differences in the densities of serotonin 1A receptors between P and NP rats. *Alcoholism: Clinical and Experimental Research* 14: (326) Abstract.
- Panksepp J (2005). Affective consciousness: Core emotional feelings in animals and humans. *Consciousness and Cognition*, 14: 30-80.
- Vander AJ et al (1994). *Human Physiology: the mechanisms of body function* (6th edn). McGraw-Hill Inc.
- Watson D et al (1988). Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales. *Journal of Personality and Social Psychology*, 54(6): 1063-1070.



Emma Purnell
BSc MSc RVN CertNut

Emma qualified as a veterinary nurse in 2008 and works full-time as an area sales manager for Nutravet (UK). Until recently, she was a head nurse based in Worcestershire and loves keeping in touch with practices. She also has a BSc in Zoology with Animal Ecology and a MSc in Ecology, helping to fuel her interest in more exotic species. She has a particular love of 'small furies' and nursing clinics, and has just gained a Grade A with distinction in Canine and Feline Clinical Nutrition (CertNut).

Nurse clinics – a benefit to your practice and your clients

More and more practices are now offering nurse clinics as part of their services. But why? What benefits do they offer to the practice and clients? Is it something you should be considering for your practice?

Veterinary nurses have a wealth of knowledge and can often provide the perfect link between the veterinary practice and the client. The veterinary surgeons in the practice are invariably perceived as being busy, and clients – even when presented with an opportunity to discuss problems with them – tend to hold back and not ask things they consider to be “silly” or “unimportant”, even if these things are actually much more important than they realise.

A typical example is with the diabetic patient – the client may not want to ask at diagnosis what impact the “odd treat” might have on their pet’s condition; yet it can be hugely frustrating to find this out several weeks down the line when the patient is still unstable and the veterinary team doesn’t understand why!

Sometimes clients may not fully understand the clinical terms used by veterinary surgeons and may feel embarrassed to say so at the time. Nurses – seen as being more “on their level” – can bridge this gap by forming a bond with the client and ensuring, through dialogue, that more of these smaller questions are asked and answered.

Nurturing the bond

As well as being a point of contact, the nursing team can offer more opportunities for clients to discuss areas of their pets’ lives that they may feel are a “waste” of the veterinary surgeon’s time – this is especially the case with puppies and kittens at their first few visits to the practice. At this point, people are



“Active referrals of cases to the nurse clinics from veterinary consultations adds weight to the nurse’s judgement and knowledge in the client’s mind, and enhances the nurse’s status as a valued and respected member of the team”

normally excited about their new family member and have many questions – about toilet training, diet, preventive care, neutering, behaviour, play, to mention only a few! It is rare that a single veterinary surgeon consultation – during which a full health check and vaccination take place – also offers sufficient time to cover all these other points in detail; whereas a complementary nurse appointment allows

clients to both enthuse about their pet and to learn more of the important advice we can give.

This, in turn, will help to bond the client with your practice – and bonding clients with your practice is hugely important. It means that they are much less likely to be drawn to competitors because they would rather their “family member” is



**Suggested Personal & Professional Development (PPD)*



NURSE CLINICS

"... more practices are beginning to charge for their nurse clinics"

seen by staff they "know and trust". Trust can be hard to gain with some clients, owing to their deeply held beliefs that practices are only out to "get their money". Once they begin to know you and your team – and understand how much you *really* care – this perception will be dispelled.

Increasing this bond with the clients and enhancing the role of the nursing team within the practice can provide a huge boost to the motivation of the nurses involved. Engaging them proactively with clients and allowing them to use the skills they have developed will increase their satisfaction and improve the perception of veterinary nurses in society as a whole.

Establishing protocols

Time is – and will always be – a major problem in most veterinary practices, and proper use of the nursing team will help to free up more of the veterinary surgeons' time. By similar token, veterinary surgeons need to have confidence in the advice being given in each nurse clinic and the initial protocols should be developed as a team effort.

This process can help to improve motivation within the practice team as a whole as long as it is done in a fair and equitable way – all members of the team should be able to have input into the process and no ideas should be thrown out or 'rubbished' at any point.

Protocol discussions should include the theoretical and practical areas that will be covered during the nurse clinic, as well as the advice that should be recommended. For example, when you are running a puppy clinic, areas to be considered might include worm and flea advice,

diet, neutering, socialisation, habituation and teaching clients how to carry out a basic health check.

By formulating the protocols with the whole practice team, the veterinary surgeons are enabled to promote the nurse clinics more effectively, and to adjust their own consultation appointments and advice to complement them. Active referrals of cases to the nurse clinics from veterinary consultations adds weight to the nurse's judgement and knowledge in the client's mind, and enhances the nurse's status as a valued and respected member of the team.

Specific follow up

The use of 'packs' to give out to clients after they attend clinics can be very helpful and will cement the key points discussed within the clinic in the client's mind. Do remember that simply dishing out large volumes of generic leaflets or samples can actually dilute and confuse the message you want to get across. Instead, prepare your own tailored files containing leaflets and other information especially suited to your consultation.

The use of more specific materials – which can be personalised and targeted to the specific pet – will be perceived as real added value. Such items might include weight charts, mobility scoring cards, 'before-and-after' photographs (great for displays with client permission!) and certificates for when goals are met, and will encourage return visits and bond clients more thoroughly.

Staff training when running nurse clinics is key. Ideally, all nurses running the clinics should be confident in the clinical area they

are discussing, happy to perform any required checks competently and to answer any questions that may be presented within the clinic. At the same time, if they are not sure of an answer, it is important that nurses seek advice from other team members rather than giving out incorrect advice.

In some practices, nurse clinics are offered free of charge; and while this may be great for encouraging clients to attend, more practices are beginning to charge for their nurse clinics. After all, they are run by trained and knowledgeable professional staff and take up their time and effort and add value – so should we not be assigning a monetary value to this service we offer?

How to start up nurse clinics

Starting up nurse clinics in practice is always exciting for the staff members involved, but organisation and planning is important to ensure that they are successful and of maximum benefit to all concerned.

Not all nurses want to be involved with nurse clinics and it is important that the staff you have are keen and enthusiastic about the challenge. As to which nurse clinics to begin with, there are

many options; but some seem to work better as initial clinics than others:

- puppy and kitten clinics are a great starter as clients are inevitably excited about their new addition to the family and generally keen to discuss their care and progress at this point
- weight clinics can also be very popular because the issue of obesity in our pets is a growing problem and one of which clients are becoming more aware. There are also some very good staff training programmes run by food companies that can help with both setting up and managing these clinics
- nurse clinics to carry out tasks such as claw clipping, second vaccinations and microchipping can also be offered and will certainly help to free up valuable veterinary appointment slots.

There are also important questions to ponder about when and where clinics can and will be held (**Figure 1**).

Effective promotion

Promotion is critical to the success of nurse clinics. Waiting room displays can be great to target clients visiting the practice, with staff recommendations backing up any queries. Targeted letters or e-mails to clients can be

- is there a designated room that can be used?
- will the clinics need to be run around vet consulting times to ensure there is a room available?
- when will there be a nurse free and able to run the clinics?
- how will this impact the rest of the rota?
- does this need to change the way staffing is managed and are there enough staff to be able to run the clinics at all?
- are the clinics going to be held during the day or in the evenings when working clients are more likely to be able to attend?
- can appointments be offered on Saturdays?

Figure 1. Questions that need to be addressed.



"The use of 'referral slips' is a good idea..."

useful in some cases – for example, with senior or post-neutering clinics – to advise of the benefits on offer and encourage appropriate clients to book appointments.

For initial launches, targeted client evenings on subjects can help to encourage clients to come in for one-to-one discussions later; and the practice website, practice newsletters, fliers and contacting local papers can also help. The best method of promotion, however, will always be referral from other members of the team – especially veterinary surgeons during consultations.

The use of 'referral slips' is a good idea – giving the client a slip of paper for them to hand in at reception on the way out referring them to a specific nurse clinic, means that reception staff are made aware of exactly what has been discussed, quickly and easily. Making these slips brightly colour coded can also allow reception to spot them in clients' hands if they are a bit unsure and make sure they are implemented effectively.

Feedback and review

Once clinics have been up and running for a couple of months, it can be good to arrange a meeting to discuss their impact and progress. At this point, it is possible to assess how people feel

the clinic is going, what the take-up has been like, any client feedback, new ideas to improve them, but also any concerns or worries staff may have. It can also be useful at this point to look at exactly what number of nurse clinics have been booked as well as client attendance – have they actually arrived for these booked appointments or have there been a high number of 'no-shows'?

If clients are not arriving for booked appointments, why not? Are they simply forgetting? Do they not see the benefit of the appointment? Are they put off by charges? Calling clients to get feedback in these areas can be useful to improve things in the future. It is also possible to assess the income generated by the clinics, referrals to a veterinary surgeon and additional sales.

Whilst setting targets for these things can be done and discussion of other areas of preventive care should always be encouraged, care must be taken to ensure staff do not feel pressured to force sales on clients as this can damage the practice/client bond. This feedback ensures that the clinics are run as well as possible, and ensures all staff involved can feel confident and know their thoughts and ideas are being included, leading to increased motivation all round. ■

PPD Questions

- Which of these are most important when setting up nurse clinics?
 - ensuring you have staff enthusiastic and happy to carry out the clinics
 - having a separate clinic room
 - planning posters and displays
 - targeting client e-mails and letters
- Which points might be included in a nurse clinic protocol?
 - health check points to cover
 - recommended products
 - current practice protocols
 - all of the above
- Which staff should be involved in putting together a nurse clinic protocol?
 - nursing team only
 - nurses and vets
 - nurses and receptionists
 - the whole nursing team
- Which method of promotion might be best utilised for newly set up weight clinics within practice?
 - targeted client e-mails and letters
 - local newspaper advert
 - recommendations from other members of the practice team combined with waiting room displays
 - client fliers
- Going back and assessing the progress of nurse clinics is important because:
 - it allows other members of the team to pick out faults
 - it helps to improve the service to the client and boost staff moral
 - protocols are no longer needed
 - staff doing the clinics can be swapped

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



Kerry Doolin
BSc BVSc MVEtMed MRCVS

Kerry graduated from the University of Sydney in 2005 and, after 12 months working in a small animal general practice in the city, spent several years as an emergency clinician in private practice.

In 2013, she completed a specialty emergency and critical care internship at the University of California, Davis; followed by an emergency and critical care residency at the Royal Veterinary College in London.

Kerry's interests include transfusion medicine, mechanical ventilation and toxicology.



*Suggested Personal & Professional Development (PPD)



ANAEMIA

Investigating anaemia in dogs – causes, diagnosis and treatment

Anaemia is a common presenting sign in critically ill dogs and is defined as reduced haemoglobin concentration leading to a reduction in the oxygen-carrying capacity of blood (Giger, 2015).

Dogs with anaemia will present with a variety of clinical signs based on the underlying cause, the duration of onset and the severity of the anaemia. For example, a patient may have obvious haemorrhage and present for that reason; or if it has chronic anaemia, then it may present with lethargy; and, if acute haemorrhage has occurred, the patient may present with collapse secondary to hypovolaemic shock.

Physical examination findings may include:

- lethargy
- pale or icteric mucous membranes (**Figure 1**)
- petechiation or ecchymoses
- tachycardia
- tachypnoea
- hypovolaemic shock.

Diagnostic procedures

Signalment and history

Signalment and history are pertinent to the diagnostic process.

Breed is relevant for diseases with a genetic predisposition – such as the hereditary blood diseases, immune-mediated haemolytic anaemia in the cocker spaniel and von Willebrand's disease in the Doberman. Sex is also relevant; so, for example, haemophilia A and B are found in males (Giger, 2015).

Relevant information that can be obtained from a detailed history includes:

- geographic location and international travel (exposure to tick-borne pathogens)
- evidence of blood loss via faeces (melaena [**Figure 2**] or haematochezia), epistaxis, vomiting or other subtle

blood loss (excessive grooming leading to palatine artery erosion and oral haemorrhage)

- exposure to human medication (hormones, anti-thrombotic therapy)
- toxin ingestion (rodenticide, some heavy metals, onions/garlic).

Packed cell volume and total protein

Typical packed cell volume and total protein reference ranges for dogs and cats are shown in **Table 1**.

Reductions in total protein, with anaemia, supports blood loss. Care should be taken, however, to consider elevations in total protein with low-range normal packed cell volume because this can be an often-overlooked anaemia, masked by dehydration.

Evaluation of the haematocrit/microhaematocrit tube can supply information pertinent

to changes in plasma and white blood cells.

Discolouration of the plasma may support hepatic disease (yellow), haemolysis (varying shades of orange-red-purple), noting that slight red discolouration of the plasma may be secondary to venipuncture in a normal patient. A secondary cause of haemolysis, owing to certain infections or neoplasia, may have an increased buffy coat.

Complete blood count and blood smear

Anaemia can be classified as regenerative or non-regenerative. This classification is useful in the first stages of the diagnostic plan when we consider the red blood cell count. Factors that are included in the red blood cell count are shown in **Table 2**.

The blood film evaluation is important for all clinicians

Figure 1. An example of an icteric sclera.



Figure 2. An example of melaena.



Table 1. Typical packed cell volume and total protein reference ranges for dogs and cats (Giger, 2015)

	Canine	Feline
Packed cell volume (%)	37 - 55	25 - 45
Total protein (g/L)	54 - 71	60 - 86

Table 2. Red blood cell indices (Stockham & Scott, 2008)

Red blood cell indices	Definition
Mean corpuscular volume (MCV)	Volume per average erythrocyte expressed as femtoliters (fL)
Mean corpuscular haemoglobin concentration (MCHC)	Cellular haemoglobin concentration per average erythrocyte expressed as grams of haemoglobin per 100ml of erythrocytes (g/dL)
Mean corpuscular haemoglobin concentration (MCH)	Quantity of haemoglobin per average erythrocyte expressed in picograms (pg)
Red blood cell distribution width (RDW)	Calculated value (%) that reflects the amount of variation in the erythrocyte volumes
Reticulocyte count	Expressed as absolute or percentage of immature erythrocytes and must be corrected for anaemia severity
Red blood cell changes visible on blood film evaluation seen in anaemia	
Anisocytosis (Figure 3)	Variation in red blood cell size due to immature anucleated RBC that are larger than mature RBC
Polychromasia (Figure 3)	Immature anucleate erythrocytes that are blue owing to large amounts of RNA which offsets the red of haemoglobin causing them to appear purple
Nucleated red blood cells (Figure 4)	Progenitor immature red blood cells in circulation
Howell-Jolly bodies	Fragments of non-functional nucleus
Spherocytes	Red blood cell with membrane loss caused by action of macrophages or trauma or abnormal cytoskeleton
Basophilic stippling	Aggregation of RNA in the cytoplasm of erythrocytes

to perform because much information can be gained from this procedure. Once the monolayer is evaluated for differential count, red cell morphology and pathogens, platelet and white blood cell count, the feathered edge should be assessed for platelet clumps and white blood cell populations.

MCV, MCHC and MCH are Wintrobe's erythrocyte indices and characterise erythrocytes in peripheral blood. These indices help to indicate the type of anaemia – for example, a macrocytic (elevated MCV), hypochromic (low MCHC) is consistent with a regenerative response after blood loss or haemolysis (Stockham & Scott, 2008).

Saline agglutination

Agglutination of red blood cells is a pathological finding of immune-mediated haemolytic anaemia resulting in antibodies binding to the surface of red blood cells causing them to stick to each other (**Figure 5**). This is a simple test performed with one drop of 0.9 per cent saline and one drop of fresh whole blood.

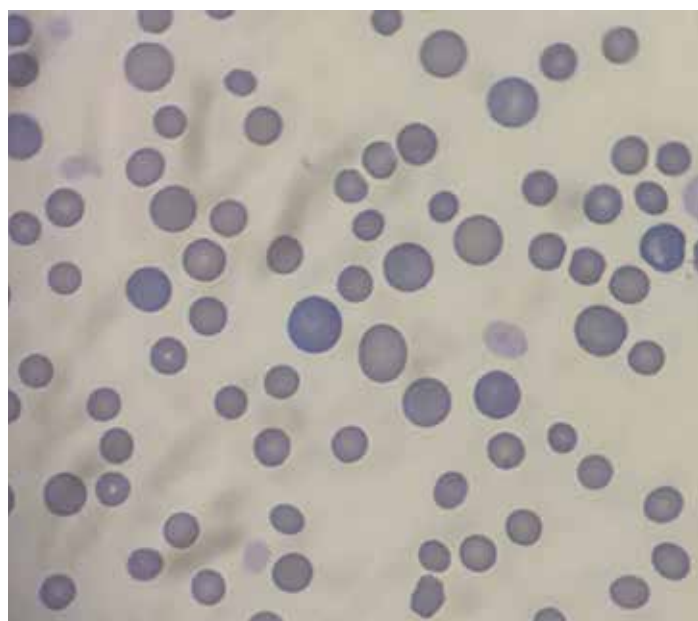
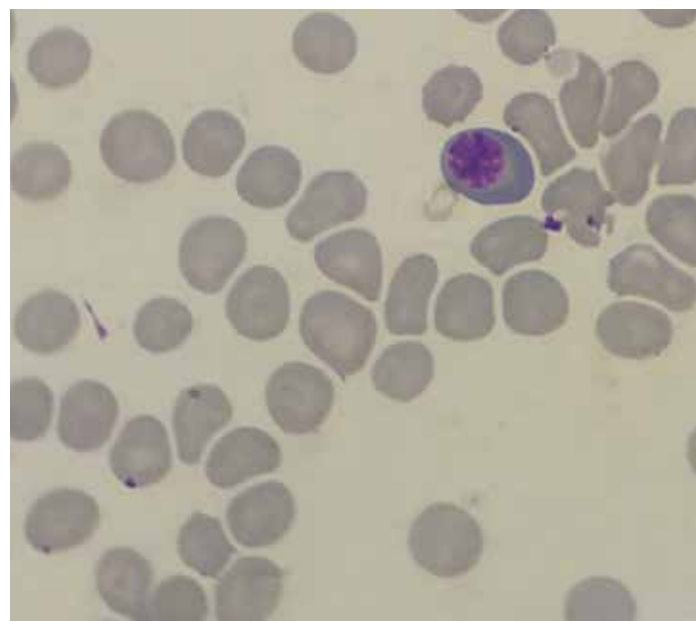
Figure 3. An example of polychromasia and anisocytosis.**Figure 4.** Nucleated red blood cells.

Figure 5. Agglutination of red blood cells is a pathological finding of immune-mediated haemolytic anaemia.



Figure 6. A bleeding time template device.



Assessment of haemostasis

Primary haemostasis is evaluated by means of the platelet count and platelet function. Thrombocytopenia is a frequent haemostatic defect; with clinical haemorrhage uncommon above a platelet count of $70 \times 10^9/L$. In-house platelet function can be assessed via a buccal mucosal bleeding time (reference range 2-4 minutes).

Bleeding time template devices, such as the Surgicutt (Figure 6), administer an automated, depth-controlled incision. Caution must be applied to not dislodge the clot and not to perform in instances of thrombocytopenia. Physical examination findings consistent with defects in primary haemostasis include petechiae, ecchymoses and melaena.

Clotting factors and their pathways evaluate secondary haemostasis,

Table 3. Summary flow chart of causes of anaemia and potential diagnostic pathways (Ettinger, 2010)

Regenerative anaemia		Non-regenerative anaemia
Haemorrhage	Haemolysis	
Rule out: <ul style="list-style-type: none"> ■ trauma ■ thrombocytopenia, thrombocytopathia ■ coagulopathy ■ neoplasia ■ gastrointestinal ulceration ■ parasitism 	Rule out: <ul style="list-style-type: none"> ■ envenomation ■ oxidative damage ■ erythrocyte parasites ■ microangiopathic anaemia ■ haemophagocytic syndromes ■ enzymopathies and hereditary anaemia ■ immune-mediated haemolytic anaemia <ul style="list-style-type: none"> – primary – secondary 	Rule out: <ul style="list-style-type: none"> ■ pre-regenerative anaemia ■ destruction of bone marrow ■ deficiency of nutrients for erythropoiesis ■ development damage deep in the bone marrow ■ diversion of haematopoietic cells ■ myelophthisis ■ anaemia of chronic disease ■ pseudoanaemia ■ drugs
	Other regenerative anaemia: <ul style="list-style-type: none"> ■ alloimmune haemolytic anaemia 	

Table 4. Complications of blood product administration (Yagi and Holowaychuck, 2016)

Immunologic transfusion reactions (acute)	Non-immunologic transfusion reactions (delayed)
Febrile non-haemolytic (most common)	Non-immunologic haemolysis
Acute haemolytic	Circulatory overload
Allergic/anaphylactic	Hypocalcaemia
Delayed haemolytic	Sepsis

and useful assays include activated coagulation time (ACT), prothrombin time (PT), activated partial thromboplastin time (aPTT), fibrinogen or proteins induced by vitamin K absence/antagonism (PIVKA).

Other specialised external laboratory diagnostic tools for assessing coagulation include global assays, such as viscoelastic clot detection methods (thromboelastometry, thromboelastography [TEG]), specific factor assay analysis and tests of fibrinolysis (D-dimer, tPA and TEG).

Infectious disease investigation techniques

In-house tests that can be performed by the clinician in this respect include assessment of blood film and faecal smear for infectious agents. A fresh blood smear must always be used for evaluation of blood parasites because

some organisms can fall off erythrocytes of samples aged over 24 hours. The faecal smear facilitates detection of *Angiostrongylus vasorum* larvae.

Some blood parasites induce a cyclic parasitaemia, are subclinical carriers, and also misdiagnosis sometimes occurs when artefacts mimic infectious agents. Polymerase chain reaction or antigen-based assays are commercially available for use either in-house (IDEXX *Angiostrongylus vasorum* Antigen assay or 4DX [*Dirofilaria immitis*, *Borrelia*

burgdorferi, *Ehrlichia canis* & *ewingii* and *Anaplasma phagocytophilum* & *platys*] assay); or at external laboratories (*Babesia* spp., *Anaplasma* spp., *Cytauxzoon* spp., as well as the previously mentioned agents) (Greene, 2012).

Additional potentially useful tests during the diagnostic work up of an anaemic patient would include serum biochemical analysis, diagnostic imaging of the thorax and abdomen, urinalysis and faecal analysis. Bone marrow aspirate and

Figure 7. Calculation for administration of packed red blood cells or whole blood (Yagi and Holowaychuck, 2016).

Volume to be transfused =

$$\frac{\text{desired PCV minus patient PCV} \times A \times \text{bodyweight(kg)}}{\text{donor PCV}}$$

immediately [where A = 90ml/kg (dogs), 100ml/kg (cats)]

Table 5. Blood products and indications for their use (Yagi and Holowaychuck, 2016)

Blood product	Contents	Main indication
Whole blood	RBC, WBC, platelets, all clotting factors, albumin, globulin	Anaemia with coagulopathy or platelet disorder
Packed red blood cells	RBC, WBC, non-viable platelets, small amount of plasma	Symptomatic anaemia of any cause
Platelet products <ul style="list-style-type: none"> ■ platelet-rich plasma ■ platelet concentrate ■ lyophilised canine platelets ■ DMSO-preserved frozen canine platelet concentrate 	Platelets (alone or with small amounts of plasma or DMSO-preserved – depending on the storage agent)	Marked thrombocytopenia with critical haemorrhage
Fresh frozen plasma	All clotting factors, albumin, globulin	Coagulopathy with clinical haemorrhage or coagulopathy without haemorrhage but planned invasive procedure
Cryoprecipitate	Concentrated factors VIII, XIII, vWF, fibrinogen and fibronectin	Haemophilia A, von Willebrand's disease, fibrinogen deficiency
Cryosupernatant	Factors II, V, VII, IX, X, XI	Deficiency of factors II, V, VII, IX, X, XI

core biopsy should be pursued in non-regenerative anaemia.

Simplified approach to causes and diagnosis

Perhaps a better understanding of the causes and diagnosis of anaemia can be achieved if it is classified as blood loss, haemolysis and reduced erythropoiesis (Table 3).

Treatment

Transfusion medicine

The decision to administer blood products requires consideration of many factors, including patient packed cell volume (or haematocrit or haemoglobin), laboratory parameters (elevated lactate), patient assessment (hypotension, tachypnoea or respiratory distress, tachycardia and weakness) and, often, underlying disease process.

Figure 7 shows the calculation for administration of packed red blood cells or whole blood.

A quick estimation can be made with the following calculations for both dogs and cats:

- volume of packed red blood cells to be administered = 1ml/kg per 1% change in PCV required
- volume of whole blood to be administered = 2ml/kg per 1% change in PCV required

In 1999, the TRICC study evaluated transfusion requirements in critical care people and found that a restrictive transfusion strategy targeting haemoglobin of 70 - 90g/L, rather than a conventional and liberal transfusion strategy targeting haemoglobin 100 - 120g/L, was associated with a better survival rate (Hebert et al, 1999).

The TRISS study supported the Surviving Sepsis Campaign by adjusting their target and recommending red blood cell transfusion only when the haemoglobin is less than 70g/L (Holst, 2014). A restrictive policy benefits:

- the patient because the administration of blood products is not a benign procedure
- the client as they are not inexpensive
- the blood bank's resources.

Complications of blood transfusion

These are shown in Table 4.

There is a clear association in humans with transfusion reactions and an increased mortality, yet this is not well established in veterinary patients (Hollowaychuck et al, 2014). However, it is likely that many



Figure 8. Autotransfusion as a means of providing blood also needs to be considered and multiple techniques have been described.

transfusion reactions in veterinary patients are not detected and, as such, the complication rate of 3.3 to 28 per cent in dogs and 1.2 to 8.7 per cent in cats receiving blood products is likely to be much higher (Yagi and Holowaychuck, 2016).

Also, in the UK there is only one commercial veterinary blood bank (Pet Blood Bank UK) that supplies canine blood products; there is an ongoing difficulty in sourcing feline blood; and the oxygen-carrying bovine haemoglobin product, Oxyglobin, is no longer available. All of which restricts the availability of blood products to the veterinary surgeon.

Which blood product to use?

Prior to administration of red blood cells, blood typing must be performed. This is unnecessary for the administration of plasma products. If a recipient has previously received red blood cell products, then a cross match must be performed at an external laboratory or in-house via kits (Alvedia) or manually.

If a patient has not received a blood transfusion previously and blood typing is not possible, then the use of DEA 1-negative blood is appropriate once. This is not ideal, however, for both the recipient and the ongoing supply and demand of DEA 1-negative blood. For a fee, the Pet Blood Bank UK can supply products on the same day.

The choice of blood product administered will most often be the result of availability. Commercial blood banks generally supply packed red blood cells and fresh frozen plasma. Packed red blood cells are appropriate for anaemia of any cause. Whole blood is more readily available to hospitals with in-house donor programmes

and may be of benefit to thrombocytopaenic patients with critical haemorrhage; otherwise, packed red blood cells are sufficient and can prevent circulatory overload. **Table 5** provides an extended list of blood products available.

Autotransfusion as a means of providing blood also needs to be considered. The primary benefits of this technique include reduced pressure on commercial blood bank resources, reduced risk for transfusion reactions and ready availability. The process involves the collection of blood from either the abdominal or thoracic cavity and its re-administration via a peripheral venous catheter.

Multiple techniques have been described (Robinson et al 2016, Higgs et al 2015, Kellett-Gregory et al 2013) (**Figure 8**). However, the key points include the importance of sterility of both collection and administration and the use of filtration – all practices that would be in place for the

collection and administration of any blood product.

The use of anticoagulants, such as acid citrate dextrose (ACD), in the collection device is based upon the duration of blood within the cavity and, in general, there is no need for the use of ACD for effusions of greater than one hour owing to defibrinisation.

Risks of autologous blood administration include sepsis, microembolism of fat or air, microaggregates of platelets or leukocytes, coagulopathy and haemolysis (Robinson et al 2016). ■

References

- Ettinger and Felman (2010). *Textbook of Veterinary Internal Medicine 7th edn*. Elsevier Saunders, Missouri.
- Giger U (2015). Anemia. In: *Small Animal Critical Care Medicine 2nd edn*. Saunders USA. pp 575-579.
- Greene CE (2012). *Infectious diseases of the dog and cat, 4th edn*. Elsevier Saunders, Missouri.
- Hebert PC et al (1999). A multicenter, randomized, controlled clinical trial of transfusion requirements in critical care. *The New England Journal of Medicine* 340(6): 409-417.
- Higgs VA et al (2015). Autologous blood transfusion in dogs with thoracic or abdominal hemorrhage: 25 cases (2007–2012). *J Vet Emerg Crit Care* 25(6): 731-738.
- Holowaychuck (2014). Risk factors for transfusion-associated complications and non-survival in dogs receiving packed red blood cell transfusion. *Journal of American Veterinary Medical Association*. 244(4): 431-437.
- Holst L et al (2014). Transfusion thresholds in septic shock. *The New England Journal of Medicine*. 371(15): 1381-1391.
- Kellett-Gregory LM et al (2013). Autologous canine red blood cell transfusion using cell salvage devices. *J Vet Emerg Crit Care* 23(1): 82-86.
- Robinson DA et al (2016). Autotransfusion in dogs using a 2-syringe technique. *Journal of Veterinary Emergency and Critical Care* 26(6).
- Stockham SL and Scott MA (2008). Chapter 3 Erythrocytes. In: *Fundamentals of Veterinary Clinical Pathology 2nd edn*. Blackwell Publishing, Iowa USA. pp 107-223.
- Yagi and Holowaychuck (2016). *Manual of Veterinary Transfusion Medicine and Blood Banking*. Wiley Blackwell, Iowa.

PPD Questions

- Which of the following blood products would be the most useful in a thrombocytopaenic dog with mild melaena?
 - fresh frozen plasma
 - no blood product indicated
 - platelet-rich plasma
 - cryosupernatant
- What is an immature anucleate erythrocyte called that appears purple in colour?
 - spherocyte
 - polychromatophil
 - nucleated red blood cell
 - ghost cell
- Which of the following is not a known cause of anaemia?
 - Ehrlichia canis*
 - Dirofilaria immitis*
 - gastrointestinal ulceration
 - envenomation

1.B, 2.B, 3.B
Answers

Veterinary nurse training



At a centre near you

Training centres located in:



Bristol



Ipswich



East Malling



Stowmarket



Exeter



Talk to us about training and recruiting veterinary nurses, becoming a training practice and our range of courses and CPD programmes.



CENTRAL COLLEGE OF
ANIMAL STUDIES

The skills to succeed

For more information and an application pack
T: 01359 243 405 or E: enquiries@ccoas.org.uk

www.ccoas.org.uk



Jane Ellison
BSc(Hons)

Jane is one of the senior information scientists at the Veterinary Poisons Information Service, having started her career in human toxicology at the National Poisons Information Service at Guy's Hospital. In addition to working on the 24-hour team, she provides CPD courses on small animal poisonings, lectures at conferences and to veterinary practices and their clients, and writes for a number of publications.

Definitely better than cure

Of all the cases coming through the doors of veterinary practices every day, there are many that could not (easily) have been prevented by the owner – hereditary disease, breed-specific conditions, road traffic accidents, organic disease and cancers to name but a few. However, there is one category in which numbers could be greatly reduced – if not entirely prevented – and that is poisoning, especially from agents in and around the home and garden.

Many owners are vigilant and proactive in ‘pet-proofing’ their homes, applying the same care as they would to ensuring safe surroundings for their children. One of the challenges faced by veterinary professionals is to raise awareness of *potential* risks and to provide education for owners.

Obviously, it is not as straightforward as it seems, because no matter how careful owners are, animals are inquisitive, determined and, in many instances, prone to mischief. So short of watching them 24 hours a day, accidents will still happen in the most organised and conscientious of households.

Making the most of client contact

An ideal time to provide clients with literature, advice and reminders is at their very first visit – be it with a new kitten or puppy, or a new animal to the practice. A brief list of things to keep away from pets can be handed out with vaccination reminders, check-up or appointment cards.

Confusing concepts

Part of the issue is that, understandably, the very words ‘poison’ and ‘poisonous’ conjure up specific images or concepts of bottles or containers featuring skull and crossbones – and could not be further from the box of chocolates, bouquet of lilies or slice of fruit cake that are often the real risk to our companion animals.

In an attempt to counter the “I didn’t know that was

toxic” response, the Veterinary Poisons Information Service (VPIS) has many leaflets and posters that we are always happy to send out, or they can be downloaded from our website. They cover both the general concept of poisoning prevention, as well as information on specific agents such as human medications, anticoagulant rodenticides and chocolate; and they are written specifically for owners.

General advice

It is always useful to encourage owners to look at their homes through the eyes of their pets.

Never leave medicines lying around, or unattended in bags or rucksacks on the floor. Try to rescue any dropped medicines immediately – given how determinedly reluctant cats are to take any sort of pill or tablet that you try to administer to them, it is remarkable how quickly they will voluntarily pounce on a dropped paracetamol capsule!

If an owner has a medication that is applied to their skin, emphasise that their pet should not lick or groom them, simply because there have been cases of animals ingesting significant amounts of drugs in this way. This even applies to minoxidil, a preparation used to slow hair loss and promote hair regrowth in some people. It is available as a generic and branded medication to treat androgenic alopecia.

For similar reasons, any transdermal patch for pain relief or an anti-smoking aid should be disposed of securely

as soon as it is removed from the body.

Ensure that owners understand they should never give human medications to their pets – the VPIS receives many enquiries each year where well-intentioned owners have given human analgesics to their pets.

Always store food securely away from pets – the most well-behaved animal is never averse to supplementing their diet with anything extra they can find. Most households contain chocolate, including drinking chocolate and cocoa powder; this should be stored in drawers or wall-mounted cupboards because dogs, in particular, have no notion of portion control, and every year the VPIS has a number of fatal cases as a result of chocolate toxicity.

Other foods that should be kept well away from pets and never fed to them as treats include grapes, raisins, sultanas, currants and onions – so that includes left-over stews, casseroles and take-away foods. Ensure that any kitchen ‘caddy’ for organic recycling is closed securely to prevent animals accessing mouldy food which can lead to toxicity from tremorgenic mycotoxins. This would also apply to dustbins.

Any houseplants should be ‘animal-friendly’ and, of course, lilies should never be present in a household that contains cats – owners should be aware that even the pollen or the water that lilies have been kept in represent a real risk to cats.



*Suggested Personal & Professional Development (PPD)



POISONS



Advise owners that letter boxes should be fitted with cages or guards, so that any samples – edible or inedible – delivered to the home are not swiftly ingested by pets. There have been some tragic cases of xylitol-containing chewing gums, delivered as mail-shot samples, causing fatalities.

Containers of household chemicals, such as white spirit, decorating products and mastics; and cleansing preparations, such as disinfectants, bleach and drain cleaners, should be well sealed, or re-sealed once opened. Products containing benzalkonium chloride are particularly hazardous to cats.

Laundry products, especially the more recent concentrated capsules, seem to hold a particular fascination for pets, and if they are spilt, can cause significant issues both to the skin and from ingestion following grooming.

Prevent access to areas of the garden that have been treated with pesticides, fertilisers, weedkillers and, especially, slug baits, even if the packaging describes the product as 'pet-friendly'. Do not leave diluted products in unattended watering cans or buckets, and always dispose safely of any left-over preparations.

Packaging

If you are contacted about a poisoned animal, always ask the

owner to retain the packaging and/or bring it with them to the surgery – an exact name will help identify the constituents and to assess the risk. Even if the packaging has been chewed, there is often sufficient information to determine which product is involved.

Prevention of poisoning outside the home

Cats and dogs do not spend their entire time in the confines of the home and garden, so it is important to highlight ways in which owners can keep their pets safe when away from their normal, more controlled (and hopefully, safe) environment.

Cats on the prowl

Cats will do whatever they like and go wherever they want, so there is very little the owner can do to ensure their cat's safety when they are out of sight. However, maintaining good relations with neighbours, and asking surrounding home owners to be careful with – or at least notify cat owners if garden products, particularly slug baits, and in winter, antifreeze – have been used, or their use is imminent.

Cat owners are best placed to be able to identify any unusual behaviour in their pets following a nightly excursion, and the more promptly veterinary advice is sought, the better the chance of a positive outcome.



Dogs on a walk

One of the highlights of a dog's day, the walk is an opportunity to explore new surroundings and smells; but it also represents a small, but real, risk of exposure to potential hazards.

On any walk which includes a bridle path or an area where horses are present, the owner must be vigilant to ensure the dog does not eat any horse manure. Horses that have been given ivermectin worming products do not absorb the drug fully, and much of it is excreted, unabsorbed, in the faeces – and, as such, poses a threat to any animal for whom such a large dose of wormer is not intended.

Although it is not practical for owners to observe every move of their dog, if the animal is seen ingesting mushrooms or fungi on the walk, the owner should try to remove the material from the dog's mouth, and if possible, either take a sample of the fungus, or photograph of it, so that if the dog does develop clinical effects, or the owner wants to pre-emptively check with their veterinary practice, there is a source from which an identification of the species involved can be made.

Farm buildings and barns are often the sites of rodenticide application, and owners should be aware that any dog having access to

these buildings is at risk of anticoagulant rodenticide exposure. Depending on the weight of the dog and the amount and type of rodenticide involved, this may or may not be a problem acutely, but it becomes much more of a risk if exposure is chronic.

Reassuringly low toxicity

In addition to increasing awareness of high potential risks and hazards, it is also useful to inform owners of things that are generally regarded as having low acute toxicity – such as oral contraceptives, over-the-counter multivitamins, silica gel, shower gels and shampoos, cosmetics and skin care products and emulsion paints. ■

Resources

VPIS website: <https://vpisglobal.com>

Order or download leaflets:
<https://vpisglobal.com/flyers-and-leaflets/>

Contact VPIS: info@vpisglobal.com



Integration – for a more efficient and effective practice laboratory service

As the volume of laboratory testing increases – both internally and externally – so the need for veterinary and laboratory staff to be highly organised and efficient becomes more important.

Prioritising the order of testing, ensuring that routine laboratory tasks and maintenance are carried out and running a well-organised result filing/storage system are all vital to the smooth running of a practice's laboratory service.

Time is always of the essence when it comes to laboratory testing; so any system that can reduce the time taken to organise the laboratory workload and ensure maximum communication – within and without the practice – should be welcomed with open arms. Time management has become increasingly important too, particularly when requesting external lab tests and recording results.

As a wider array of tests become available to practices, so the potential for errors and lost records increases. It is worth bearing in mind too, that one of the most common client

complaints is a lack of clarity regarding tests carried out on their pets. Test results, therefore, must be correctly filed and made available throughout all branch locations without compromising on efficiency; because as the laboratory becomes busier and the testing more complex, the potential for even more dissatisfied clients increases unless the practice addresses its laboratory systems and procedures.

Put all these factors together and the need for a dedicated laboratory information management system (LIMS) that achieves full laboratory integration becomes vital. A LIMS must come with a wealth of features designed to support the modern laboratory, focussing on time efficiency, automatic result filing and resource management.

An ideal LIMS should have some of the following features:

Integration of internal equipment

All internal equipment should transmit results digitally into the patient record – this reduces the massive time expenditure of entering results manually. Additional check features should also be in place to ensure results are filed correctly.

Bidirectional communication with suitable equipment is an added benefit, allowing the user to schedule tests on internal equipment and receive results digitally with no need for entering details on the equipment itself.

External laboratory integration

External laboratory request forms should also be part of any LIMS, with in-built tools for pre-filling forms with patient data, practice contact details and tests required, as well as the facility for printing specimen labels. This is a guaranteed way to save you time and enable the running of a more efficient laboratory.

The resulting external lab data received should be linked to patient records. Again, checks should be made to ensure results are not lost or filed to the wrong patient record.

AT Veterinary System's LIMS provides the above key points and a multitude of innovative features including:

interactive customised whiteboards – with resource availability for normal working patterns and scheduled downtime. Tasks can be assigned to particular employees or groups of staff with macro tasks for linked tests. Task clash notifications show if resources have been overbooked

external lab form generation – with a unique 2D barcode on the cover page ensuring each task is individually identifiable. The majority of UK laboratories are already included in AT's LIMS, providing a vast database of external tests

task libraries with advanced filtering by resource, assignee and status

integrated into Spectrum DDS – results are linked and filed to patient records, for easy comparison with previous tests.

Having complete control over your laboratory activities – both internal and external – is the way forward for the modern and efficient practice laboratory service.

An integrated laboratory information management system means fewer lost results, reduced time spent on laboratory tasks, correct uploading into patient records and easy access throughout the practice network for scheduling and results analysis. ■

Managing your laboratory workflow using LIMS

View and schedule your lab tasks on interactive whiteboards, including recurring tasks such as cleaning and maintenance, with the reassurance of equipment availability and resource clashing notifications.



Two-way communicating lab equipment allows tasks to be completed more efficiently.



Results are sent and received digitally to the client's records.



Tasks are selected from the library and sent to the relevant equipment, lab or printer.



Callbacks can be generated automatically, notifying staff of task completion, in addition to invoice prompting for high-cost items to ensure proper billing procedures are maintained.



Marie Rippingale
BSc(Hons), REVN, clinical coach,
G-SQP, DipHE CVN, DipAVN(Equine)

Marie is head equine nurse and a clinical coach at XLVets practice Scarsdale Vets in Derby. Marie is also a lecturer on the veterinary nursing diploma course at Bottle Green Training, Melbourne, Derbyshire.

Equine anaesthesia – (1) pre-operative patient preparation and induction

Following the results of the *Confidential Enquiry into Perioperative Equine Fatalities* (CEPEF 1-3; 2002-2004), it has been suggested that horses have an unusually high risk of mortality as a result of undergoing general anaesthesia, when compared to other species. This article is part one of three, and will discuss the main considerations involved in the preparation and induction of general anaesthesia in equine patients.

Records of 41,787 operations under general anaesthesia (GA) were submitted by 149 clinics from 19 countries between 1991 and 1996. The total mortality from perioperative complications in horses was found to be 1.9 per cent. This is in comparison with mortality rates reported for humans, cats and dogs undergoing GA at <1 per cent (Johnston, 2005).

For this reason, any registered veterinary nurse (RVN) wanting to be involved with equine anaesthesia will require specific knowledge, so that identified risk factors can be addressed.

Pre-operative patient preparation

It is important to take the time to prepare equine patients correctly prior to general anaesthesia. Elective surgical cases will ideally be admitted the day before the operation. This allows the patient to settle down after travelling and to be evaluated thoroughly (Murrell & Ford-Fenneh, 2012).

A complete history should be taken from the owner and a comprehensive physical examination of the equine patient should take place. Particular emphasis should be put on the cardiovascular and respiratory systems, as well as checking for any pre-existing lameness or other injuries (Murrell & Ford-Fenneh, 2012).

Bodyweight

The patient should be weighed, ideally using an electronic weighbridge;

or if this is not possible, a weigh tape can be used. It is important to obtain this information because anaesthetic doses are calculated on the basis of bodyweight (Murrell & Ford-Fenneh, 2012).

Starving

It has always been common practice to starve equine patients for 12 hours before anaesthesia to reduce the volume of the gastrointestinal system. The pressure imposed by the weight of a full abdomen compromises diaphragmatic movement and contributes to hypoventilation, particularly when the horse is positioned in dorsal recumbency (Murrell & Ford-Fenneh, 2012). This thesis, however, is now being challenged, because starving equine patients is thought to contribute to the incidence of postoperative ileus and caecal impaction.

Many hospitals have now reduced the starvation time to eight hours, especially for fit Thoroughbreds that may be at risk from equine gastric ulcer syndrome (EGUS) or impactions. In young foals, withholding food is often contra-indicated (Murrell & Ford-Fenneh, 2012) and it is not necessary to remove water from equine patients prior to anaesthesia.

Shoe removal

Shoes are removed to protect the horse and the recovery box floor during induction and recovery from the anaesthetic. The feet must then be pared

and thoroughly scrubbed clean and, after induction, covered with rectal sleeves to prevent contamination prior to winching the patient into theatre (King, 2015). If shoe removal is not possible, tape should be placed over the shoes before induction.

Grooming

The horse should be groomed thoroughly to prevent contamination of the theatre. Some horses, especially those with long coats and limb feathering, may require bathing to facilitate asepsis (King, 2015). The mane should be plaited if long and the tail tied up and covered with a bandage or rectal sleeve.

Mouth cleansing

Rinsing the horse's mouth is vital to prevent the patient from aspirating food material on placement of the endotracheal tube (King, 2015). A large dental syringe may be used for this and the water should be warm. Mints can be added to the water to flavour it, as this can make it more palatable to the patient. This will encourage co-operation with the procedure too.

Intravenous (IV) catheter placement

The catheter should be placed into the left jugular vein if the horse is to be positioned in dorsal recumbency, or the uppermost vein if the horse is to be positioned in lateral recumbency (King, 2015). An aseptic skin preparation of the catheter site is essential before placement to reduce the risk of complications,



*Suggested Personal & Professional Development (PPD)



ANAESTHESIA

Table 1. Medications commonly used in multimodal anaesthesia in equine patients (Murrell & Ford-Fenneh, 2012)

Class of agent	Mechanism of action	Clinical effects	Side effects	Metabolism
Phenothiazines (e.g. acepromazine maleate)	Dopamine agonist. Inhibition of catecholamine activity in CNS.	<ul style="list-style-type: none"> ■ calming ■ anti-arrhythmic ■ antihistamine 	<ul style="list-style-type: none"> ■ hypotension owing to blockade of peripheral alpha-1 receptors and a direct vasodilator effect ■ hypothermia ■ use reduced doses in foals and animals in liver dysfunction/cardiovascular compromise 	Liver metabolism and renal excretion
Alpha-2-agonists (e.g. detomidine, romifidine and xylazine)	Activation of alpha-2 adrenoreceptors in the central nervous system (CNS). Analgesia is moderated by action at central and peripheral adrenoreceptors.	<ul style="list-style-type: none"> ■ potent sedation ■ muscle relaxation ■ analgesia 	<ul style="list-style-type: none"> ■ initial hypertension followed by normotension ■ bradycardia ■ respiratory system depression ■ hypothermia ■ sweating 	Liver metabolism and renal excretion
Non-steroidal anti-inflammatories (NSAIDs)	Peripheral action to inhibit production of tissue prostaglandins by inhibition of the enzyme cyclooxygenase, which mediates production of prostaglandins. CNS action mediating analgesia and antipyretic actions.	<ul style="list-style-type: none"> ■ analgesia ■ anti-inflammatory ■ antipyretic 	<ul style="list-style-type: none"> ■ gastrointestinal ulceration ■ renal toxicity ■ hepatotoxicity ■ blood dyscrasias 	Liver metabolism
Opioids	Act on receptor sites in CNS and other tissues. Act as agonists, antagonists or a combination of both.	<ul style="list-style-type: none"> ■ analgesia ■ synergistic effect when used in combination with other classes of drugs 	<ul style="list-style-type: none"> ■ increased locomotor activity ■ respiratory depression ■ mydriasis ■ reduced gastrointestinal motility ■ euphoria 	Liver metabolism and renal excretion
Benzodiazepines (e.g. diazepam, midazolam)	Potentiate the action of inhibitory neurotransmitters, particularly GABA in the CNS. Specific benzodiazepines receptors adjacent to the GABA receptor complex.	<ul style="list-style-type: none"> ■ not sedative in adult horses ■ calming ■ hypnosis ■ muscle relaxation ■ anticonvulsant action ■ useful for sedation of young foals 	<ul style="list-style-type: none"> ■ minimal cardiovascular or respiratory side effects 	Liver metabolism and renal excretion
Dissociative anaesthetics (e.g. ketamine)	Hypnotic effects largely mediated by blockade of NMDA and HCN1 receptors, but cholinergic, aminergic, and opioid systems appear to play both a positive and negative modulatory role in both sedation and analgesia (Sleigh et al, 2014).	<ul style="list-style-type: none"> ■ analgesia ■ anaesthesia 	<ul style="list-style-type: none"> ■ horses induced without a muscle relaxant will remain stiff during the operation 	Liver metabolism and renal excretion

such as thrombophlebitis (Rippingale & Fisk, 2013).

Clipping

Ideally, a large area around the surgical site should be

clipped – as a guide, there should be at least a hand-span's width clipped around where the incision is going to be made (King, 2015). A size 40 clipper blade is ideal

for a close surgical clip. Care must be taken not to damage the skin while clipping, as this may increase the risk of postoperative sepsis (Hendrickson, 2012).

One practical advantage of pre-operative clipping is that it does significantly reduce anaesthesia time for the patient (King, 2015). However, the decision about whether

to clip pre-operatively or not is usually determined by the surgeon in charge of the case.

Foot preparation

All horses' feet should be scrubbed thoroughly before surgery because they provide many areas for harbouring bacteria. For surgery involving the foot – or a structure close to the foot – scrupulous preparation is essential (King, 2015). Once the shoe has been removed, the foot should be pared and nail holes opened up prior to cleaning.

There are many different suggestions as to how to prepare equine feet for surgery; but Johnson et al (2015) found that soaking the foot for 12 hours with either iodine tincture or povidone iodine is *not* recommended because these solutions can cause

damage to the skin. Johnson et al (2015) also noted bacterial recolonisation occurred after soaking with povidone iodine, so they recommended a four-minute disinfection technique, using either iodine tincture or povidone iodine (0.5% available iodine) for appropriate pre-surgical preparation.

Hennig et al (2001) found that bacterial numbers were significantly reduced by removal of the superficial hoof surface – by paring the feet with a hoof knife, for instance, by application of a povidone-iodine scrub, and by use of a 24-hour povidone-iodine soak. However, bacterial populations $>10^5$ g per tissue persisted after these disinfection techniques.

It is, therefore, worth considering the use of

chlorhexidine gluconate in pre-surgical foot preparation, as chlorhexidine has residual activity against bacteria, and is not inactivated by organic material – unlike povidone-iodine. This, along with paring the feet before surgery, could be a useful and effective cleaning technique; although there is currently no empirical evidence to support this.

Regardless of the technique used, a foot dressing should be applied after cleaning and then covered with an empty drip bag, secured around the cannon with adhesive tape to keep the area clean and dry (King, 2015).

Pre-operative medication

By definition, premedication is the administration of an appropriate agent prior to anaesthesia to facilitate induction, maintenance and

recovery (Murrell & Ford-Fenneh, 2012). Premedication and induction often involve using several different agents together to give a balanced overall effect. This is known as multimodal anaesthesia and the medications used in the induction of equine anaesthesia are presented in **Table 1**.

Along with these medications, local anaesthetics are also used in multimodal anaesthesia. Local anaesthetics are often used to help to reduce surgical stimulation whilst the patient is under GA and to help to promote a smooth recovery. The main local anaesthetics used in equine practice are presented in **Table 2**.

Analgesia and antibiotics

During general anaesthesia, activation of neural pathways by noxious stimuli causes a change in the processing of sensory stimuli by the peripheral and central nervous systems (Murrell & Ford-Fenneh, 2012). Consequently, hyperalgesia (increased pain resulting from stimuli that would normally cause pain) and allodynia (stimuli that would not normally cause pain, such as touch) start to elicit pain.

Pre-operative analgesia is a critical component of any anaesthetic regimen and can limit the onset of hyperalgesia and allodynia, contributing to improved pain management in the postoperative period (Murrell & Ford-Fenneh, 2012).

Analgesic strategies are also commonly multimodal, utilising more than one class of analgesic drug at the same time – administration of an opioid and a non-steroidal anti-inflammatory drug (NSAID), for example. Different classes of analgesic generally act on different neurotransmitters and receptors within the pain pathway. Combining these

Table 2. Local anaesthetic agents used in multimodal anaesthesia in equine practice (Murrell & Ford-Fenneh, 2012)

Local anaesthetic agent	Class of agent	Clinical pharmacology	Comments
Lidocaine hydrochloride	amide	<ul style="list-style-type: none"> ■ rapid onset of action ■ duration of action 90-180 mins ■ 2% solution used for infiltration and local nerve blocks ■ 4% solution used in topical preparations ■ can be administered intravenously in low doses. 	<ul style="list-style-type: none"> ■ Can be irritant to tissue. ■ Multiple nerve blocks may result in tissue swelling.
Mepivacaine hydrochloride	amide	<ul style="list-style-type: none"> ■ rapid onset of action ■ duration of action longer than lidocaine because of less vasodilator action ■ 2% solution used for infiltration and local nerve blocks. 	<ul style="list-style-type: none"> ■ Commonly used in clinical practice, particularly for distal limb nerve blocks. ■ Less irritant to tissue than lidocaine. ■ Less effective topically than lidocaine.
Bupivacaine hydrochloride	amide	<ul style="list-style-type: none"> ■ slow onset of action ■ prolonged duration of action 180-500 mins ■ more potent than lidocaine and mepivacaine used at concentrations 0.124-0.75%. 	<ul style="list-style-type: none"> ■ More cardiotoxic than lidocaine or mepivacaine.



Figure 1. A padded knock-down box is required to allow safe induction for equine patients.

agents provides more effective analgesia compared the administration of a single class of analgesic drug alone (Murrell & Ford-Fenneh, 2012) and multimodal analgesia techniques generally provide superior analgesia.

The RVN should be familiar with the different classes of analgesic drugs used and work with the veterinary surgeon responsible for the case to ensure that the correct analgesic medication is given prior to induction.

The veterinary surgeon in charge of the anaesthetic procedure and the surgeon carrying out the operation should discuss and agree on the antibiotics required prior to surgery so these can be given pre-operatively. Antibiotic protocols should be in place and based on the British Equine Veterinary Association (BEVA) 'Protect ME' campaign, aimed at promoting responsible antimicrobial use in practice.

Induction

Generally, a tranquilliser – acepromazine, for example – is given first, either intravenously or intramuscularly, and this helps to calm the patient. Following this, the patient is walked round to the induction box and given an

alpha-2-agonist. This serves to sedate the patient before the induction medication is given – it must be given sufficient time to take effect and will work much better if given in a quiet, calm environment. Once the patient is deemed ready by the anaesthetist, ketamine and diazepam may be given and the horse induced for general anaesthesia.

Padded boxes reduce the risk of injury to the horse during induction (**Figure 1**). There are different methods for trying to control induction for equine patients.

Free fall

Free fall is where the patient is left in the knock-down box alone after the induction medication is given. This method is not generally recommended because the horse is not controlled during induction and can land awkwardly. This method is sometimes put into place if the horse is very large and there is not sufficient room for handlers to stay in the knock-down box safely.

Support from handlers

Generally, two handlers will hold the horse, ensuring that the head is kept down to prevent the horse from falling over backwards as it loses consciousness (**Figure 2**).



Figure 2. Handlers often support the patient during the induction process.

Swing door

Some knock-down boxes incorporate a crush door that forms part of the wall of the induction box and can be folded out. During induction, the horse is positioned between the door and the wall of the box. This provides control as the horse assumes recumbency. The door is then folded back into the wall of the knockdown box during recovery (Murrell & Ford-Fenneh, 2012).

Tilt table

A few equine hospitals use tilt tables for induction. The horse is sedated and positioned adjacent – and parallel to – the table, orientated vertically. Bellybands are placed under the horse and are tightened to provide support as anaesthesia is induced. When the horse is anaesthetised, the table is rotated to a horizontal position. A padded knock-down box is required for recovery (Murrell & Ford-Fenneh, 2012).

Sling induction

The horse is sedated and put into a sling before anaesthesia is induced. During induction, the sling takes the weight of the horse and the horse is lowered into recumbency in a controlled manner. This method is useful for the induction of fracture patients in order to prevent possible

displacement of the fracture as recumbency is achieved. Use of this method also depends on the temperament of the patient, because not all horses will tolerate being put into a sling.

There are advantages and disadvantages to each induction method described above and the RVN should discuss the most appropriate method to be used with the anaesthetist, taking into consideration the facilities and trained personnel available, as well as the temperament of the patient.

Conclusion

Horses are high-risk candidates for general anaesthesia. Although anaesthesia and recovery must be induced and monitored by a qualified veterinary surgeon, review and application of correct GA medication and induction protocols, along with proactive, evidence-based preparation of the patient, can all be achieved and undertaken by an RVN.

In these ways, the RVN can contribute significantly to the reduction of risk factors for horses undergoing GA and help to ensure high standards of patient care. ■



Imogen Burrows

BVetMed CertAVP(EM) MRCVS

Imogen qualified from the Royal Veterinary College, London, in 2000. She has worked at Cliffe Equine Vets, a member of XLVets Equine, since 2006 and was awarded the RCVS Advanced Veterinary Practice Certificate in Equine Medicine in 2014.

Prevention of allergic skin disease in horses

Managing allergic skin disease is often a challenging and frustrating experience for both practitioner and owner. While in the my experience it is rare to be able to diagnose definitively the underlying cause in such cases, a logical and systematic approach must be employed to attempt to do so.

Culicoides spp. hypersensitivity, atopic dermatitis, contact and food allergies may occur in combination, and as allergies are both multifactorial and additive, it is important to identify and correct as many factors as possible to control pruritus and make the patient comfortable (Fadok, 2013).

The most common dermatological presenting signs associated with allergies are pruritus and urticaria (**Figures 1-3**); although as the diseases progress, self-trauma results in secondary infections leading to further diagnostic challenges (Fadok, 2013; Diesel, 2014; Marsella, 2013; Paterson and Ball, 2013 and Scott & Miller Jr, 2011). These complicating factors must be diagnosed and treated with appropriate antimicrobial therapy. Failure to do so will result in significant reduction of the efficacy of all other treatments and preventive measures.

It is important to manage client expectations from the outset. In particular the following should be communicated:

- the duration of all treatments and the associated costs
- the expected clinical course of the disease and preventive measures
- that preventive measures must be rigorously and consistently applied.

Clinical signs often wax and wane, and seasonal symptoms may become persistent over time (Scott and Miller Jr, 2011). The 'pruritic threshold' explains why an individual is able to tolerate a certain amount of pruritic stimulation



Figures 1-3. Marked urticaria (on the same horse) which is one condition associated with allergic skin disease.



*Suggested Personal & Professional Development (PPD)



IMMUNOLOGY

without developing clinical signs (Marsella, 2013). While not all causes of allergic skin disease can be removed or avoided, targeting preventive measures at as many contributory factors as possible in order to drop below the threshold, may result in an asymptomatic horse.

Controlling pruritus

This is important to prevent additional self-trauma and improve comfort for the horse. A combination of topical and polymodal systemic treatment may be required. Glucocorticoids remain the mainstay of treatment and can be used topically and systemically (Fadok, 2013; Marsella, 2013 and Scott & Miller Jr, 2011).

Triamcinolone 'spray and leave-on' hydrocortisone conditioner – as well as a variety of creams – are available and are useful on face and ear lesions that may be impossible to shampoo. Where shampoos are used, it is important to use warm water and employ a minimum contact time of 10 minutes to maximise their efficacy.

Other non-glucocorticoid therapies include antihistamines, antidepressants (Table 1), pentoxifylline and essential fatty acid supplements, in particular flax seed, as well as methylsulphonylmethane (MSM); although there is little convincing evidence available for the latter two, they may help to decrease clinical signs (Marsella, 2013 and Scott & Miller Jr, 2011).

It should be noted that antihistamines are best used in combination with other management options and instigated prior to the disease process being fully established for best clinical effect. They do not appear to be particularly efficacious in *Culicoides* spp. hypersensitivity cases (Marsella, 2013).

Topical treatment should not be undervalued. Even cold water, along with oatmeal-based shampoos, can reduce pruritus for up to 72 hours.

Allergen avoidance

Insect feeding occurs at dusk and dawn, so stabling around these times in particular will help. It is worth noting that many horses are allergic to other insect types – blackflies, *Stomoxys* (stable flies) and *Tabanid* spp. (horse fly, deer fly), although *Culicoides* spp. are the most common.

Fans mounted in stables will reduce feeding behaviour because *Culicoides* spp. are unable to fly and feed in brisk breezes. Also, as *Culicoides* spp. do not fly far from their breeding ground (1-2km), keeping horses away from standing water is essential (Diesel, 2014; Fadok, 2013 and Scott & Miller Jr, 2011).

Diligent and repeated use of repellants is necessary, and preference should be given to products containing two per cent or higher of permethrin in formulations that adhere to the coat and are not easily washed off by the rain (Fadok, 2013). Fadok (2013) suggests permethrin spot-on products may be useful on specific problem areas (poll, base of neck and tail) while sprays may be used on the rest of the body.

Fly masks and rugs can be impregnated with permethrin, although it is also worth examining these with owners, because soiled coverings may not only attract midges but may also predispose to secondary infections, especially in hot, humid weather. N,N-diethyl-m-toluamide (DEET) has been reported to cause sweating, irritation and exfoliation with repeated application, so should be avoided; however, anecdotally, Skin-So-Soft (Avon) diluted with equal parts water is effective (Scott & Miller Jr, 2011).

"Environmental triggers in atopic patients can be varied and numerous"

In allergic diseases – other than those caused by *Culicoides* spp. hypersensitivity – avoidance may be significantly more difficult, and usually relies on precise identification in the first instance (Scott & Miller Jr, 2011).

Food allergens are identified using a food trial and rechallenge – alfalfa, soybean and peanut being common culprits (Marsella, 2013). Diesel (2014) suggests a food trial involves feeding a single feedstuff for at least four weeks. A novel bulk food – something that the horse has not been exposed to previously – should be used as the dietary base, making sure to withhold any additional supplements, concentrates and additives during the trial period.

The novel bulk food may vary by region, but can include a single-grass species of hay, or a wilted vacuum-packed grass product (haylage). If, however, other potential causes have been eliminated, the horse responds to standard medical therapy for urticaria, and recurrent episodes are reported, then serum IgE and/or intradermal allergen testing may be useful.

Contact allergens are identified through patch testing. Avoidance is critical to control food and contact allergies.

Environmental triggers in atopic patients can be varied and numerous. It is important to appreciate that many more specific allergens, such as moulds and dust mites, are found within the forage and litters. Changing hay to haylage and straw to shavings, can reduce particulate material from 70 per cent to 30 per cent respectively (Scott & Miller Jr, 2011). Equally, regular housekeeping in the stable to remove dusts, feathers, dander and insects is important in reducing allergen loads.

Allergen-specific immunotherapy (ASIT)

Hyposensitisation using ASIT may be preventive in nature as it stops the allergic reaction, thereby ameliorating clinical signs (Scott & Miller Jr, 2011 and Fadok, 2013). It is, however, often used in combination with other therapies. ASIT is most commonly used in atopic horses – those with genetically predisposed inflammatory and pruritic allergic skin disease having characteristic clinical features associated with IgE antibodies invariably directed against environmental allergens (Scott & Miller Jr, 2011).

Allergen testing is used in these cases predominantly to identify which allergens should

Antihistamines	hydroxyzine
	chlorpheniramine
	diphenhydramine
	cetirizine
Heterocyclic antidepressants	amitriptyline
	doxepin
Pentoxifylline	

Table 1. Non-glucocorticoid medications

be included in the ASIT, *not* to make a diagnosis of atopy. Equally, when making this decision, the results of the testing should be interpreted in the light of the patient's clinical disorder. This includes the seasonality, likelihood of exposure and change of false-negatives and false-positives. A positive reaction only demonstrates the presence of the skin-sensitising antibody, not that the individual is allergic (Diesel, 2014; Marsella, 2013 and Scott & Miller Jr, 2011).

Although evidence is sparse in the horse, ASIT is widely thought to be of use in atopic patients (Marsella, 2013). Stepnik et al (2012) demonstrated that owners' impressions supported this; with 84 per cent citing a good response to ASIT – with a significant drop in the use of glucocorticoids whilst undergoing this treatment. Although responses may be seen within three to six months, to completely evaluate the response to this management a full year of therapy is needed, and lifelong treatment is likely (Marsella, 2013).

Summary

An allergic skin disease case in the horse can be daunting to manage, often presenting many months – or even years – after its inception, accompanied by secondary skin changes that may confuse the practitioner and confound diagnosis. It is vital to maintain a methodical approach to the investigation because – more so than in any other medical case – diagnosis, treatment and prevention are inextricably linked.

While it may seem counterintuitive to the owner to be advised about insect avoidance and repellency in his or her horse that does not appear to have 'sweet itch', it is imperative we communicate the importance of a multifactorial preventive plan in each and every case, to ensure the best outcome. ■

"... it is imperative we communicate the importance of a multifactorial preventive plan in each and every case, to ensure the best outcome"

PPD Questions

1. Name four common types of allergic skin disease?
2. What is the 'pruritic threshold'?
3. Why do antidepressants have an antipruritic effect?
4. Suggest some reasons for negative intradermal skin test results

Answers

1. *Culicoides* spp., hypersensitivity; atopic dermatitis; contact allergy and food allergy
2. The level of pruritic stimulus above which clinical signs are exhibited. According to the theory of the pruritic threshold, an individual is able to tolerate a certain amount of pruritic stimulation without developing clinical signs. Once that threshold is exceeded, clinical signs ensue.
3. Psychotropic drugs are particularly effective if a stress or psychogenic component is present in the disease. Additionally, these drugs are also potent H1 and H2 receptor antagonists and so possess many of the benefits of traditional antihistamines.
4. Not allergic to tested allergen; allergen too dilute; inappropriate panel; allergens used in testing; recent drug administration; glucocorticoids; antihistamines; prostaglandins and phenothiazine tranquilisers.

References

- Diesel A (2014). Equine urticaria: a clinical guide to management. In *Practice*, 36: 295-300.
- Fadok VA (2013). Update on Equine Allergies. *Veterinary Clinics of North America: Equine Practice*, 29(3): 541-550.
- Marsella R (2013). Equine Allergy Therapy: Update on the Treatment of Environmental, Insect Bite Hypersensitivity, and Food Allergies. *Veterinary Clinics of North America: Equine Practice*, 29(3): 551-557.
- Paterson S and Ball C (2013). A practical approach to equine dermatology. In *Practice*, 35: 190-196.
- Scott DW and Miller Jr, WH (2011). Skin immune system and allergic skin diseases. In: *Equine Dermatology* (2nd edn) Saunders Elsevier, St. Louis. pp. 263-313.
- Stepnik CT et al (2012). Equine atopic skin disease and response to allergen-specific immunotherapy: a retrospective study at the University of California-Davis (1991-2008). *Veterinary Dermatology*, 23(1): 29-35.

All's not well that's Thelwell

The message on the Home page of his official website, www.thelwell.org.uk, declares, 'Thelwell is regarded as the unofficial artist of the British countryside and is possibly the most popular cartoonist in Britain, since the Second World War. He commented on many aspects of human behaviour, but he is perhaps most synonymous with little girls and their little fat ponies. They have helped to ensure his continuing popularity and his immortality.'

I am sure we have all chuckled at one time or another at some of Thelwell's drawings – his powers of observation and wry humour are irresistible. But his illustrations do ride roughshod over the veterinary medical facts that little fat ponies are not necessarily a good thing from a health and well-being perspective.

Veterinary professionals have been trying to educate horse and pony owners for decades about the need to regulate their horse's food intake in order to prevent obesity and its unwanted medical and orthopaedic consequences. They have met with limited success.

It is not unreasonable to speculate that because we as a nation continue to increase in weight – over 1 in 4 UK adults is now considered to be obese – 'big' will continue to be seen by a significant proportion of the horse-owning public as a norm rather than a hazard to health. And this fact is now having a significant effect on equine welfare as the spotlight turns on to overweight riders and the effects they are having on their unfortunate steeds.

Had Norman Thelwell been alive today, he would no doubt have had a field day drawing overweight riders on their overburdened mounts. Indeed, one has only to attend a local agricultural show, hunt meet or gymkhana to see the phenomenon at first hand. But, thankfully, there are signs of action.

Vets speaking out

Last year, the *Horse & Hound** magazine carried a report that eight people were asked to dismount at the Great Yorkshire Show as they were deemed to be too heavy for their rides. Veterinary surgeon, Julian Rishworth, acting on a regulation set by the show's committee, spoke to adults riding children's ponies in the warm-up area on the Thursday of the show.

The committee ruled that the maximum rider weight allowed would be 20 per cent of the horse's weight. "We've been trying to tackle this very thorny issue for

a while now," said Julian. "It comes down to horses who are too fat and riders who are too heavy for horses, which are not necessarily mutually exclusive."

This theme was taken up in the *Veterinary Times*** by veterinary surgeon, Alex Draper, who questioned just what limits there should be on the weight of a horse rider and at what point a horse carrying excess human weight would begin to suffer orthopaedic problems or pain.

Is there a formula?

There are no hard and fast rules – with the acceptable weight depending upon such factors as the horse's size, stature and age, how skilled the rider is, what activity the horse is performing and for how long, and what orthopaedic problems the horse may have.

Alex pointed out that, as a general guideline in the UK, a rider should weigh no more than 10 per cent of the horse's bodyweight, but that in the US, this limit is doubled to 20 per cent. This means that for a 500kg horse, the range for the maximum rider weight is large – 50kg in the UK (just less than eight stone) and 100kg in the US (15st 10lb).

While there appear to be no Government guidelines under the riding establishment licence scheme, working donkeys on UK beaches have been limited to carrying no more than 50.8kg since 2008. As donkeys usually weigh no more than 180kg, this means they could be asked to carry 28 per cent or more of their bodyweight; although, of course, this is usually only for short periods at a slow pace.

What part can we play?

Veterinary professionals have an important role to play in this welfare issue and in educating clients about the weight-bearing abilities of their horses, together with the serious health issues associated with carrying too much weight.

Rider weight is becoming a 'hot topic' for riding schools, at premier horse and pony events; and most now



impose rigid weight restrictions. Yet it is debatable whether owners have the same understanding or acceptance of the problem.

An investigation carried out by Alex showed that veterinary professionals who do encounter the problem often addressed it by using the phrase, "Your horse is too small for what you want it to do" – a more diplomatic approach than suggesting that the owner is too heavy!

The Animal Health Trust has been asking owners to volunteer their horses during September 2017 to help in a 'ground-breaking' study on rider weight, with the aim of developing guidelines for an appropriate rider-to-horse weight ratio. In the meantime, veterinary professionals must use their own judgement, a degree of common sense and a bucketful of tact. ■

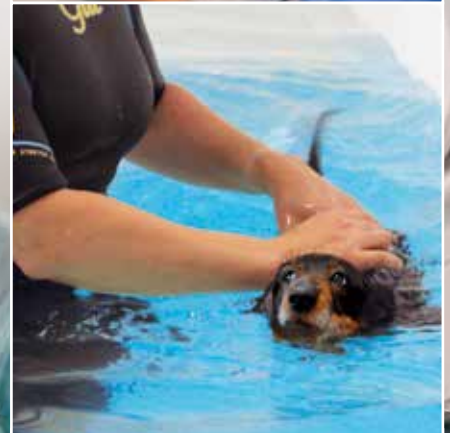
**Horse & Hound* (6 August 2016)

***Veterinary Times* 47(28).



Multi-site referral and outpatient service

- Soft tissue surgery
- Oncology
- Ophthalmology
- Orthopaedics
- Dentistry and oral surgery
- Dermatology
- Advanced diagnostic imaging
- Physiotherapy and hydrotherapy
- Companion animal behaviour



www.nvrs.co.uk



Ed van Klink
DVM(Utrecht), PhD(Waageningen
Agricultural), Dip(ECVPH)

Ed van Klink joined the University of Bristol School of Veterinary Science as senior lecturer in veterinary public health in 2011. During his career, he has spent some time in animal disease control, as a research assistant in food hygiene and as a 'government vet' for 26 years.

Ed has carried out consultancy work in animal and public health policy and legislation in many countries in eastern Europe, South America and South East Asia, and has worked in a variety of positions – as a district veterinary officer in Zambia, and as a policy officer in the fields of notifiable disease control, food safety, and animal health and welfare in The Netherlands. Currently, Ed and a colleague are setting up a bee unit for teaching purposes at Bristol.



**Suggested Personal & Professional Development (PPD)*



MEAT INSPECTION

Feedback from the abattoir – essential for on-farm health control.

Almost one billion animals are slaughtered in the UK every year. The vast majority of these are poultry and around 30 million are red meat – cattle, sheep/lambs and pigs (Defra, 2015a, 2015b). All animals are inspected – both ante-mortem and post-mortem – according to requirements laid down in both UK and European legislation (European Parliament and Council, 2004). The same legislation also prescribes that any information about findings should be fed back to both the farmer and their veterinary surgeon, especially if conditions are found that reflect on public health or animal health.

In practice, feedback to the farmer and the veterinary surgeon does not always happen. The 'intensive' sectors do often have arrangements down the food chain to exchange information backwards and forwards, as a direct consequence of these production chains being more integrated than the less intensive sectors. Where animals have passed through markets – sometimes more than once, before they end up at the abattoir – it is less obvious who needs to be informed.

Nevertheless, farmers are, by law, entitled to this information, and the Food Standards Agency is currently looking at possibilities to make it more accessible. In Northern Ireland, the APHIS system already allows farmers to access their information if they sign up for the service. If animals are rejected, the reason for rejection may be conveyed back to the farmer; but there are many pathologies that do not result in rejection of entire animals yet that are of interest to farmers and not reported automatically.

Abattoirs – and in particular the post-mortem inspection system – should be considered as the biggest free-of-charge pathology service in the nation; and though, in general, the pathological investigations carried out are looking into

gross pathology only, they do serve as indicators of health issues and may prompt further investigation.

What are we looking for?

According to an 'opinion' written by the European Food Safety Authority (EFSA, 2011), inspection has three main purposes:

- protection of public health
- protection of animal health and welfare, and
- protection of meat quality.

During the inspection process, signs of zoonotic disease, animal welfare issues,

notifiable disease and general animal health issues will be considered. Animal welfare issues are very relevant – for example, in the poultry industry, where abattoir monitoring of foot lesions is the norm. Some sheep owners, though, may receive feedback about lesions (bruising) found because of wool-pulling, which is also a relevant welfare issue.

When signs of potential notifiable diseases are seen, the course of action is clear – the Official Veterinarian does have to report it to the

"Abattoirs – and in particular the post-mortem inspection system – should be considered as the biggest free-of-charge pathology service in the nation..."



relevant authorities who will then decide what is to be done next. There are several diseases relevant to practice – zoonotic or otherwise – that are recorded in the abattoir and that constitute helpful information for farmer and veterinary surgeon alike. Some of these will be discussed below.

Fascioliasis

Liver fluke is one of the most common post-mortem findings in the UK, particularly in beef and lamb. On average, around two to three per cent of cattle passing through abattoirs will be affected; and at post-mortem, distinction is generally made between long-term fluke infections and recent fluke infections.

Fluke infestation will mostly not result in condemnation of the entire animal, although the liver will usually be rejected in its entirety. Fluke infections on farms can be a considerable problem, causing animals to grow and thrive less well than expected and, on many cattle farms, they may go unnoticed for a considerable amount of time. Prompt feedback from the abattoir may be of great value in these instances.

On sheep farms, fluke problems can be devastating. They may suffer enormously from acute fluke infections, so post-mortem data on fluke infestations of sheep livers are very useful for critical monitoring of the fluke situation in whole flocks.

Other parasites affecting the liver

In sheep particularly, livers can display scar tissue (serpentine tracks) caused by infections with *Cysticercus tenuicollis* (Stallbaumer, 1983). This parasite is also found in all other red meat-producing species, but it is of particular notoriety in sheep and lambs, where sometimes up to 70 per cent of livers may be condemned because of the scar tissue. Although this is



not a zoonotic disease and does not seem to do very much harm to the sheep, the loss of the value of the liver does constitute a significant loss of revenue.

The causative adult parasite, *Taenia hydatigena*, lives in canids, and when this is reported back from the abattoir, it will generally mean that the farm dogs are infected; and it may mean that measures must be considered to have dog walkers on public footpaths clean up more effectively after their dogs.

In pigs, ascariasis caused by *Ascaris suum* can sometimes cause serious and acute disease (Dold & Holland, 2011). Even if no immediate clinical disease is found on farm, scar tissues (milk

spots) in the livers of pigs at slaughter, can be a warning sign for the presence of the parasite on farm. This is information that farmers may have access to through the British Pig Health Scheme and it is one example of where abattoir feedback information is already used for on-farm health management.

Lung lesions

Lesions that are easily recorded at post-mortem are those indicative of pneumonias. There are many causes of pneumonia in several different species of animals, but in livestock, pneumonias that occur at herd or flock level are of particular interest.

The term enzootic pneumonia is used to indicate cases of

pneumonia where multiple animals within a herd, flock or farm are affected – each species of livestock having its own specific causative agent. In many cases, the clinical signs may be mild or even not observed; yet the growth of animals will be affected, causing delay in their reaching production weight, or higher feed costs to reach the required weight or condition.

Sheep (lambs), pigs and calves can all be affected, and the diagnosis of a group problem through post-mortem inspection in the abattoir is an effective surveillance method when this information is fed back to the farmer.

Generalised conditions

There are a number of generalised conditions that

might show up via pathological findings at post-mortem. One example in pigs is Glässer's disease (Oliveira & Pijoan, 2002). This is a polyserositis caused by *Haemophilus parasuis*. The disease does not always cause clear clinical signs and can, therefore, be present on farm relatively unnoticed for some time. At post-mortem, pericarditis and pleuritis are often pathological manifestations in finishing pigs. When these are found in several animals within one group, Glässer's disease is certainly a differential. Polyarthritis is also seen quite regularly, together with peritonitis on a less frequent basis.

Discussion

The livestock industry benefits from many sources of information with which to improve management and husbandry aimed at optimising productivity and animal health. Data generated from ante- and post-mortem inspection at abattoirs is a significant example of this.

As stated earlier, the system of ante- and post-mortem inspection in abattoirs is the biggest free-of-charge pathology service in the nation. Although it does not necessarily provide data on all economically relevant diseases – for which other means of monitoring and surveillance will remain important – for those health problems that produce gross pathology, the ante- and post-mortem results do provide valuable feedback information.

It is important to note that, by law, the farmers and – where appropriate – their veterinary surgeons, are *entitled* to receive this information. In Northern Ireland, this has been arranged so that the information only ends up with the people who have the legal right to have access to it and for whom it is relevant.

Elsewhere, because many animals pass through markets – sometimes more

than one – before being slaughtered, and some pass through a number of farms before reaching the abattoir, it may be complicated for the abattoir itself (or the Food Standards Agency) to relay the information proactively to the

relevant livestock owners and their veterinary surgeons.

Generally, proactivity on the part of the farmer is needed to ensure receipt of the information. ■

"It is important to note that, by law, the farmers and – where appropriate – their veterinary surgeons, are entitled to receive this information"

PPD Questions

- When 'serpentine tracks' are found in ovine livers, what species of animal apart from sheep needs to be taken into consideration for the management of the problem?
 - cattle
 - pigs
 - poultry
 - dogs
 - cats
- By what type of legal instrument is it made obligatory to make abattoir ante- and post-mortem information available for farmers?
 - European legislation
 - UK legislation
 - Food Standards Agency Code of Conduct
 - RCVS Code of Conduct
 - OIE Standards
- 'Serpentine tracks' are the result of which parasite?
 - Cysticercus tenuicollis*
 - Fasciola hepatica*
 - Cysticercus ovis*
 - Taenia saginata*
 - Taenia hydatigena*
- If liver fluke is detected in ovine liver at post-mortem, what generally would be the inspection decision?
 - entire animal condemned
 - liver condemned
 - excision of the affected liver tissue and approval for consumption of the rest
 - depends on the stage of the infection – if acute, the animal is condemned, if chronic, only the liver is condemned
 - liver will be assigned for processing in products containing mashed and cooked liver

1.D 2.A 3.A 4.B
Answers

References

Department of the Environment, Food and Rural Affairs (2017b). UK poultry slaughterings, weights and poultry meat production – monthly dataset. <https://www.gov.uk/government/statistics/poultry-and-poultry-meat-statistics>. Accessed 26-6-2017.

Department of the Environment, Food and Rural Affairs (2017a). UK home-killed livestock slaughterings and dressed carcase weights – monthly dataset. <https://www.gov.uk/government/statistics/cattle-sheep-and-pig-slaughter>. Accessed 26-6-2017.

Dold C and Holland CV (2011). *Ascaris* and ascariasis *Microbes and Infection*, 13(7): 632-637.

European Food Safety Authority (2011). Scientific Opinion on the public health hazards to be covered by inspection of meat (swine). *EFSA Journal*, 9(10): 2351.

European Parliament and Council (2004). Regulation (EC) No 854/2004 of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption. Official Journal of the European Union L 139 of 30: 83-127. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:226:0083:0127:EN:PDF>. Accessed 26-6-2017.

Oliveira S and Pijoan C (2002). Diagnosis of *Haemophilus parasuis* in affected herds and use of epidemiological data to control disease. *J Swine Health Prod*, 10(5): 221-225.

Stallbaumer MF (1983). Prevalence of *Cysticercus tenuicollis* in slaughtered sheep in Britain. *Society for Veterinary Epidemiology and Preventive Medicine: Proceedings of a meeting held at the University of Southampton*, 12-13 April 1983.



David Black
BVM&S DBR MRCVS

David is managing director of Paragon Veterinary Group, a three-centre, 21-vet, mixed practice. His main clinical interest is dairy practice and he gained a Diploma in Bovine Reproduction in 1998 and became an RCVS Recognised Specialist in Cattle Health and Production in 2003.

He is studying towards a Doctor of Veterinary Medicine (DVM) at Nottingham University, based on cattle advanced breeding and the effects of minerals on cattle fertility. He is also managing director (farm) of XLVets, an expanding company composed of 57 independent veterinary practices around the country, committed to the future of independent practice and British agriculture – and who are working collaboratively to deliver 'Excellence in Practice'.

David is treasurer and UK committee representative of the World Association for Buiatrics, and is a member of the Dairy Science Forum.



**Suggested Personal & Professional Development (PPD)*



REPRODUCTION

Significant advances in cattle fertility

Cattle fertility remains problematic worldwide, whilst the global human population is rising, accompanied by an ever-increasing need for sustainable protein production. There is, therefore, a requirement to amplify and exploit existing genetics and improve cattle production efficiencies.

Embryo transfer was first documented by Walter Heape who, in 1890, introduced two Angora rabbit fertilised ova into a previously mated Belgian hare doe rabbit that carried them to full term along with four of her own offspring (Heape, 1891). The technique was refined and utilised in many species, becoming a commercial breeding tool in cattle by the 1970s.

Conventional multiple ovulation and embryo transfer technology (MOET) has undergone serial improvements since then (Christie, 2001) – non-surgical recovery and transfer, cryopreservation, sexing, and enhanced regimens for superovulation, for example – and been applied extensively to increase the reproductive rate of cows of high genetic merit.

Once the birth of the first calf – following transfer of an embryo produced by *in vitro* fertilisation (IVF) was reported (Brackett et al, 1982) – advances were made in the development of relatively simple methods for producing bovine embryos *in vitro*, as reviewed by Thompson (1996). The development of a technique known as 'ovum pick-up' (OPU), which facilitated the recovery of pre-ovulatory oocytes from live donors (Pieterse et al, 1988) was largely responsible for the expansion in commercial application of *in vitro* production (IVP) of embryos.

Since 2002, there has been little change in the number of *in vivo*-produced embryos – at around 660,000 per year – while the number of transfers of *in vitro*-produced embryos

has steadily increased to around 600,000 in 2015 (Perry, 2016) (**Figure 1**). This has been driven largely by a steady, steep increase in the number of transfers in South America, particularly in *Bos indicus* cattle, which seem more suited to these techniques.

There has been a sharp increase in the numbers of OPU/IVP embryos in North America since 2011, yet little change in the numbers transferred in Europe (Perry, 2016) (**Figure 2**).

With the bovine genome now mapped to over three billion base pairs, or 22,000 genes (Larkin, 2011), our current understanding of genotypes will further enhance our ability to select parents to use in IVP programmes – and even of individual embryos prior to transfer.

Genomic testing

After six years of work, the sequencing of the bovine genome of a Hereford cow was reported by the Bovine Genome Sequencing and Analysis Consortium (Elsik, 2009). Comparative sequences from six other breeds were then used to create probes that were used to identify over 35,000 single-nucleotide polymorphisms (SNPs). These data show that, although the cattle population has undergone domestication, selection (natural and artificial) and

breed formation, which have left genetic 'signatures' within the genome, the current levels of diversity within breeds is still very large – similar, in fact, to that of humans (Gibbs, 2009).

Increasingly, cattle breeders are making use of genomic testing by means of SNP chips to assess the genetic merit of animals, because these have proved to be more efficient and cheaper than traditional progeny testing. Traits targeted using SNP chips include somatic cell count, daughter pregnancy rate, productive life, stillbirth rate and calving difficulty, and this technology has also opened possibilities for increased power to select for traits of lower heritability.

To date, the major focus of genomic testing has been on the benefit of identifying high quality young bulls early. However, the ability to use the exact same power of prediction for female young stock is now a cost-effective management tool for any cattle farmer. Genomic tests, such as Clarifide (Zoetis), work by improving the reliability of composite and individual heifer-predicted transmitting abilities, from approximately 20 to 35 per cent (based on parent averages) to a much higher 55 to 70 per cent.

Against a background of increasing dairy cattle disease incidence (NAHMS, 2007),

"Genomic testing is usually conducted on a hair sample and is available for Holstein, Friesian, Jersey and Brown Swiss heifers in the UK"

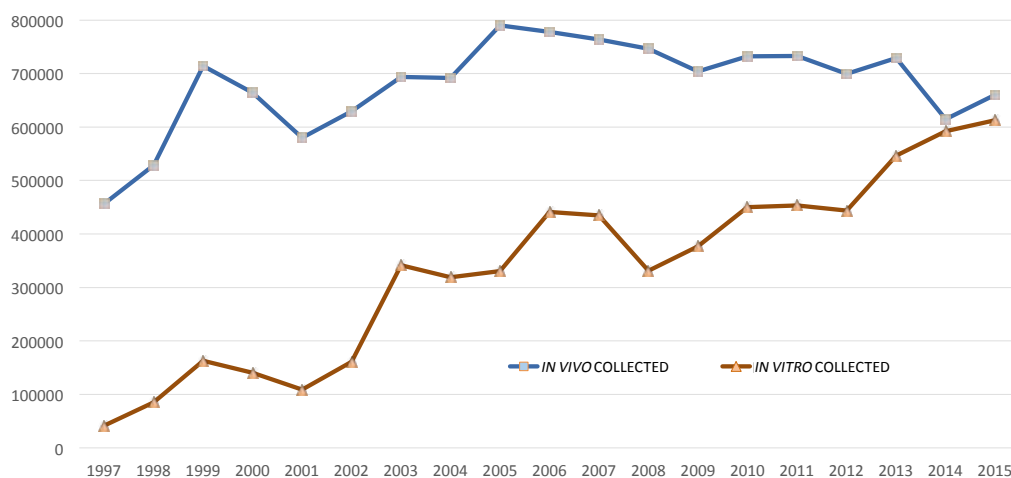


Figure 1. Chart showing the total number of bovine embryos (in vitro and in vivo) collected worldwide.

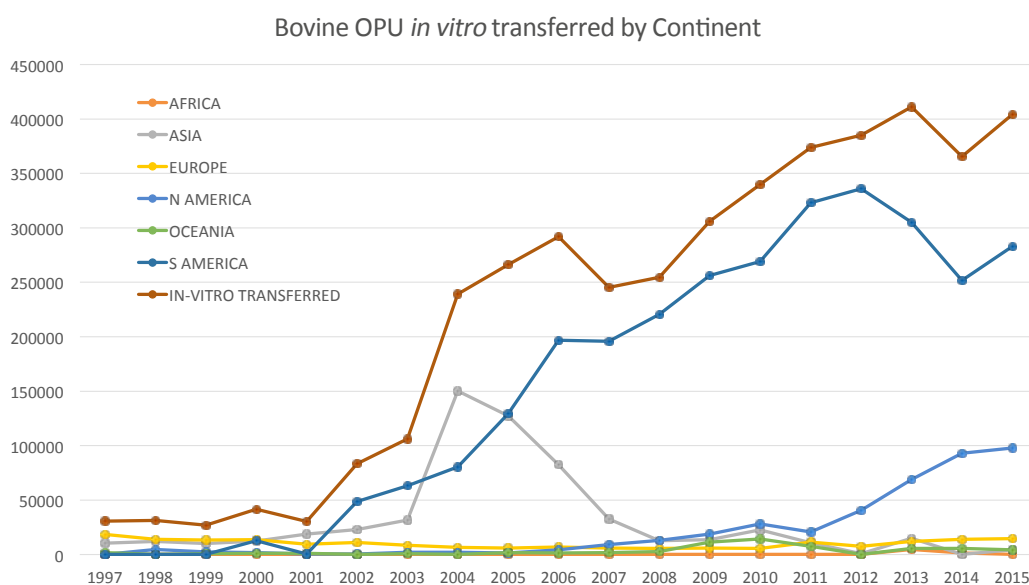


Figure 2. Chart showing the total number of bovine OPU in vitro embryos transferred, by continent.

Semex has developed a system that involves testing sires for cell-mediated and antibody-mediated immune responses, with the top 10 per cent of responders being designated as 'Immunity+'. Heritability of these traits is predicted at 30 per cent.

Thompson-Crispi et al (2014) identified genomic markers associated with these immune responses. Chromosome 23 carries the genes for the bovine histocompatibility complex (BoLA), which is closely associated with regulating immunity in cattle. Recently it has been shown

that resistance to bovine TB has a genetic component (Tsairidou et al, 2014), and this has been incorporated into a new index in the UK called TB Advantage (AHDB Dairy) – the first such index in the world.

Genomic testing is usually conducted on a hair sample and is available for Holstein, Friesian, Jersey and Brown Swiss heifers in the UK. Samples are submitted for the core selection index (such as PLI) as well as production, type, health, management and fitness traits. Genetic recessive conditions and haplotypes that

can cause significant losses are also included in the analysis.

Testing breeding heifers (recommended testing age is from 0-12 months) for desirable genetic traits allows breeders to select their best animals from which to breed replacements. This means genetic progress can be accelerated with confidence and herd profitability enhanced by capitalizing on improved performance across a number of traits.

Advantages of OPU/IVP

The techniques of ovum pick-up (Figures 3-6) and

in vitro embryo production have significant advantages over traditional breeding programmes and the use of conventional multiple ovulation embryo transfer because:

- the process is non-surgical and requires minimal treatment – other than epidural anaesthesia minimising clinical risks and pharmacological interventions
- OPU collections can be performed more frequently, so more oocytes can be collected in a shorter time period
- oocytes can be collected from both juvenile heifers and pregnant donors during the first trimester, extending the number of potential embryos that can be produced
- the technique can be used on animals with a range of reproductive disorders that might not otherwise be able to continue breeding
- less semen is used per fertilisation, so multiple donors can be fertilised with a single straw – saving money and utilising limited semen stocks
- a wide range of bulls can be used – owing to the frequency of collection – giving greater scope for genetic improvement.

IVP to amplify genetic gain

The Food and Agriculture Organization of the United Nations (UN FAO) predicts that by 2050, global demand for animal protein will rise by 85 per cent from the level required in 2008. The achievement of this – as well as to reduce the impact livestock farming might have on climate change, greenhouse gas emissions and the demand for fresh water – requires ongoing research. So it is imperative that there is a greater amplification and distribution of these outputs.

Cattle breeders recognise that it is important to generate as many offspring as possible from genetically superior or important animals. Although



Figure 3. An ovum pick-up (OPU) session in progress.



Figure 4. An example of an OPU ultrasound scanner.

the widespread use of artificial insemination has led to significant improvements in the genetic merit of cattle, there is a need to amplify female genetic lines as well, where efficient OPU/IVP has a future role to play.

The potential of IVP

The rate of genetic selection for quantitative traits can be increased by using advanced breeding technologies, such as multiple ovulation embryo transfer or ovum pick-up and *in vitro* production OPU/IVP (Hansen and Block, 2004). This is achieved by improving the accuracy and intensity of selection, in conjunction with reducing the generation interval.

In most dairy systems, farmers want replacement heifers of known breeding. The advances in reliability of sexed semen for conventional artificial insemination (AI) have led to an interest in this being

used in IVP systems. Sexing of seven-day embryos by micro-blade biopsy has been used successfully commercially (Lacaze et al, 2008) but is time-consuming on farm, and there is often wastage of the male embryos. Use of sexed semen means that 98 per cent of all embryos produced are of the desired gender, and hence the number of embryos suitable for transfer is effectively doubled.

The IVP technique is also useful in individual infertile cows, where the causes are failure of ovulation or fallopian transport, or where the uterine environment will not support a pregnancy (such as low-grade endometritis) or in situations of early embryonic death (Hansen, 2006). An essential part of the establishment of pregnancy is the production of interferon (IFNT) by the elongating blastocyst. This is the basis behind the

technique of implanting 'support' embryos one week after an insemination. Part of their effect is to create an additional source of IFNT and, therefore, improve maternal recognition of pregnancy.

IVP embryos can be produced relatively cheaply from abattoir ovaries to act as 'support' embryos. Unpublished results (JS Mullan, personal communication) suggest that around 70 per cent of calves born assisted by this method are the dam's own, the others either being the implanted 'support' embryo or twins.

Crossbreeding has been widely used in the beef industry for decades and there has been a trend towards more crossbreeding in the dairy herd recently, particularly to avoid dystocia problems with Holstein heifers (Olson et al, 2009). At least 10 per cent heterosis can be expected for total genetic merit, mainly as a consequence of increased longevity and improvement of functional traits. There is, however, some evidence of recombinant loss – and it is critical for long-term crossbreeding that genetic gain within the parental breeds is not reduced (Sorensen et al, 2008). So, IVP is likely to have a place

not only in amplifying purebred genetics, but also in creating F1 embryos for crossbreeding programmes.

IVP as a basis for other technologies

Nuclear cloning and transgenesis are technically possible, but are currently limited largely by societal concerns that have swung from initial debate about the potential cloning of humans to that of using human embryos to produce stem cells for research (Wadman, 2007). However, these techniques will also benefit from improved IVP technologies, and are likely to become a breeding tool of the future (Campbell et al, 2007)

Intracytoplasmic sperm injection (ICSI) is a technique where a single sperm cell – with acrosome and sperm membrane intact – is injected directly into a metaphase II oocyte, and then cultured *in vitro*. Although this technique is now widely used in human-assisted reproduction, it yields relatively poor blastocyst numbers and pregnancy results in livestock. However, it may be a technique to be used for genetic salvage, transgenic production, or to improve efficiencies in IVP systems – especially when using sexed semen, which is less robust

"Rather than targeting individual genes for detection of traits or diseases, karyomapping uses linkage information to map the inheritance of chromosome specific segments upon which those loci are contained"

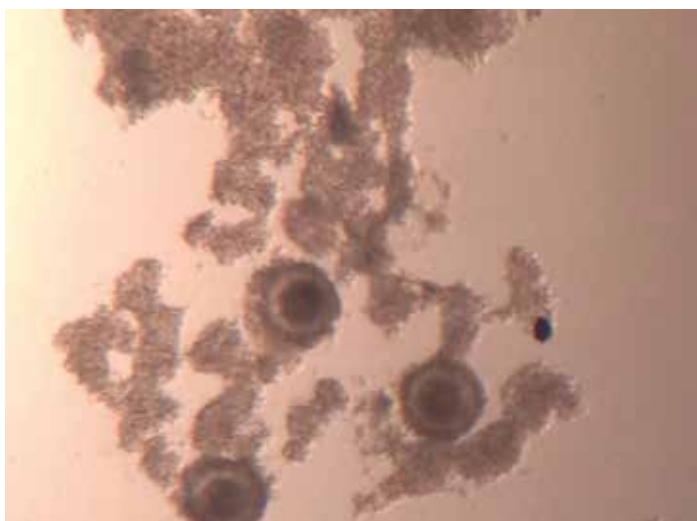


Figure 5. Typical cumulus oocyte complexes (COCs) as collected by ultrasound OPU.



Figure 6. The oocytes are matured, fertilised and cultured *in vitro*.

than conventional semen (Garcia-Rosello et al, 2009).

The diagnosis of genetic traits and/or diseases in IVP embryos or preimplantation genetic diagnosis (PGD) has been established in humans for more than 20 years. Biopsy of bovine embryos – using a laser and micromanipulator to extract between one and 10 cells – is being developed actively in the UK. Whole genome amplification (WGA) then precedes interrogation with single nucleotide polymorphism arrays (SNP chips). Any ‘gaps’ in the SNP calls can be ‘filled in’ by comparison to the genomic DNA of the parents – a technique known as karyomapping.

Rather than targeting individual genes for detection of traits or diseases, karyomapping uses linkage information to map the inheritance of chromosome specific segments upon which those loci are contained. Thus it relies on association with multiple, linked markers, rather than identification of individual causative alleles (Handyside et al, 2010a, Handyside et al, 2010b). By interrogating the embryo itself genomically, there will be a reduction in the

production and rearing of unwanted offspring, which in turn reduces ethical concerns and decreases the carbon footprint of cattle production.

Conversely, an AI stud bull is worth many thousands of pounds and young candidate sires can be marketed from two years old if the SNP chip indicates them to be of sufficient genetic merit.

Commercial farmers will be able more readily to select genetics – such as disease resistance or health traits – that suit their farm or ambitions.

Conclusion

OPU and IVP are being more widely used in other parts of the world, and are now available in the UK and Europe. Genomic interrogation and breeding

decisions based on the genotype are becoming more commonly used selection tools. The embryo genomic techniques are at an early stage of development – with initial markets being elite breeders – but these are certain to become mainstream breeding tools for all cattle in the future. ■

PPD Questions

1. What do the abbreviations OPU and IVP stand for?
2. Name three advantages of OPU/IVP over MOET (multiple ovulation embryo transfer)
3. What factor is an essential part of establishing a pregnancy and is produced by the elongating blastocyst?
4. What technique is used to interrogate the genome?
5. The reliability of predicting transmitting abilities of traits increases from 20 to 35 per cent (based on parent averages) to:
 - A. 40-55%
 - B. 55-70%
 - C. 70-85%

- Answers**
1. Ovum pick-up and *in vitro* production
 2. Frequency of collection; collections are possible from juvenile heifers and pregnant donors in first trimester; less semen required; can be used in donors with reproductive tract disorders
 3. Interferon (IFNT)
 4. Single nucleotide polymorphism arrays (SNP chips)
 5. B. 55-70%

References

- Brckett BG et al (1982). Normal Development following in vitro Fertilization in the Cow. *Biology of Reproduction*, 27: 147-158.
- Campbell KHS et al (2007). Somatic cell nuclear transfer: past, present and future perspectives. *Theriogenology*, 68: S214-S231.
- Christie WB (2001). Embryo transfer in domestic large animals. In: Noakes DE et al (eds) *Arthur's Veterinary Reproduction and Obstetrics* (8th edn) W.B. Saunders.
- Elsik CG (2009). Bovine Genome Sequencing and Analysis Consortium. "The genome sequence of taurine cattle: a window to ruminant biology and evolution". *Science* 324 (5926): 522-528.
- Garcia-Rosello E et al (2009). Intracytoplasmic Sperm Injection in Livestock Species: An Update. *Reproduction in Domestic Animals*, 44: 143-151.
- Gibbs RA (2009). Bovine HapMap Consortium. "Genome-wide survey of SNP variation uncovers the genetic structure of cattle breeds". *Science* 324 (5926): 528-532.
- Handyside A et al (2010a). Preliminary validation of SNP genotyping and karyomapping for preimplantation genetic diagnosis of fifty eight autosomal single gene defects. *Human Reproduction*, 25: I322-I323.
- Handyside AH et al (2010b). Karyomapping: a universal method for genome wide analysis of genetic disease based on mapping crossovers between parental haplotypes. *Journal of Medical Genetics*, 47: 651-658.
- Hansen PJ (2006). Realizing the promise of IVF in cattle – an overview. *Theriogenology*. United States.
- Hansen PJ and Block J (2004). Towards an embryocentric world: the current and potential uses of embryo technologies in dairy production. *Reprod Fertil Dev* 16: 1-14.
- Heape W (1891). Preliminary note on the transplantation and growth of mammalian ova within a uterine foster-mother. *Proceedings of The Royal Society of London*, 48: 457-458.
- Lacaze S et al (2008). Sexing and direct transfer of bovine biopsied frozen-thawed embryos under on-farm conditions in a commercial program. *Rencontres Autour des Recherches sur les Ruminants*, 15: 387-390.
- Larkin DM (2011). Status of the Cattle Genome Map. *Cytogenetic and Genome Research*, 134: 1-8.
- Olson, KM (2009). Dystocia, stillbirth, gestation length, and birth weight in Holstein, Jersey, and reciprocal crosses from a planned experiment. *Journal of Dairy Science*, 92: 6167-6175.
- Perry G (2016). 2015 Statistics of Embryo Collection and Transfer in Domestic Farm Animals. *International Embryo Transfer Society Newsletter*, 33(4): 9-18.
- Pieterse MC et al (1988). Aspiration of Bovine Oocytes during Trans-Vaginal Ultrasound Scanning of the Ovaries. *Theriogenology*, 30: 751-762.
- Sartori R et al (2006). Comparison of artificial insemination versus embryo transfer in lactating dairy cows. *Theriogenology*, 65: 1311-1321.
- Sorensen MK et al (2008). Crossbreeding in Dairy Cattle: a Danish perspective. *Journal of Dairy Science*, 91: 4116-4128.
- Thompson JG (1996). Defining the requirements for bovine embryo culture. *Theriogenology*, 45: 27-40.
- Thompson-Crispi KA (2014). A genome-wide association study of immune response traits in Canadian Holstein cattle, *BMC Genomics* 15(1): 559.
- Tsairidou S et al (2014) Genomic Prediction for Tuberculosis Resistance in Dairy Cattle. *PLoS ONE* 9(5).
- Wadman M (2007). Dolly: a decade on. *Nature*, 445: 800-801.



Financial planning for life



At PPS we're specialist financial advisers to the veterinary profession, so not only do we understand financial planning, most importantly we understand it in your professional context.

Whether it's about your own finances, or about your practice, we're here to support you.



Starting your career



Rewarding your team



Developing your finances



Selling your practice



Developing your practice



Planning for retirement

To find out more or to receive a free,
no obligation financial review, give us
a call on 01527 880345 or visit our
website at www.pps-vet.co.uk



@ppsvet

www.pps-vet.co.uk

Professional Practice Services is authorised and regulated by the Financial Conduct Authority, entered on the Financial Services Register under reference 218105. Address: 2 The Courtyard, Harris Business Park, Hanbury Road, Stoke Prior, Bromsgrove, Worcestershire, B60 4DJ. Professional Practice Services is a partnership owned by PPS Group Holdings Limited and Dr Paul Jackson.



Easing the burden of personnel management

Personnel management constitutes a large part of the management of a veterinary practice; and it is often the routine and repetitive tasks of rota planning and collating, recording and monitoring of staff worksheets that takes up the time of managers, preventing them from addressing more pressing personnel issues.

Rotas play a vital role in every veterinary practice; and as these businesses increase in size, so the need for efficient rota systems and effective design becomes more important. A poorly designed rota can often be a significant contributing factor to staff looking for other more 'lifestyle-friendly' practices.

Every manager aspires to being able to produce fair and accurate rotas, incorporating staff preferences and flexible working. Well-designed and carefully planned rotas are more motivating for employees, help to remove the risk of producing 'unfair' working patterns and, consequently, increase staff retention levels.

The ideal rota should enable employee information to be really well managed – allowing days off, holidays taken, training completed, shifts worked and contracted hours, to be easily accessed and monitored. Now, the good news for managers is that all this can be achieved by using AT Veterinary Systems' Rota Manager, which provides an effective, easy-to-use solution for producing and managing staff rotas.

Rota Manager

Rota Manager significantly reduces the production time of rotas. It also automatically identifies clashes and flags them up to the user. It will also allow the factoring in of issues such as UK and EU requirements and legislation.

The system is designed to accommodate flexible working and incorporate staff preferences. This eliminates the production of 'unfair' rotas – a common cause of friction in the workplace – and gives managers instant access to staff days off, holidays booked, shifts worked and contracted hours.

Using such a system ensures that your business is not over- or under-staffed and that skilled and management staff are present throughout the week. Staffing costs represent a significant proportion of a practice's overall costs, so having really efficient deployment of staff is a great benefit to the business.

The system can be networked, allowing users to view rotas from any desktop station, while rotas can also be exported and e-mailed or published on a staff intranet.





Special features of Rota Manager

- set the period of time during which a rota is valid
- record employee contracted hours – particularly useful for part-time staff
- show exceeded contracted hours with a flagged warning
- run an employee cost analysis for different pay rate codes
- access employee statistics reports to monitor whether an individual is carrying an unfair share of unpopular shifts, duties or bank holidays
- check whether a holiday request can be granted and/or accommodate an employee's work preferences
- identify areas and time periods where resource requirements have not been met
- avoid clashes in time, shifts and locations
- view how many hours employees are active and non-active
- apply filters to view staff in different departments or branches
- view a chronological list of changes made to a rota and who made them.

Personnel Manager

Employee payment is another time-consuming aspect of practice, especially so if time sheets have to be filled in, checked, digitised and then transcribed into salary payment systems. The good news is that help is at hand from AT Veterinary Systems' Personnel Manager – an additional personnel tool that can be linked to Rota Manager to populate time sheets automatically with scheduled rota times.

Employees can log in, amend hours, log extra attendance and then submit this to their managers for approval.

Managers can review the submitted time sheets and reasons for over-/under-working and send them for re-submission or sign off. The time sheets can be printed or exported to pdf or csv files.

Personnel Manager has a payroll ID for each employee – so once time sheets have been signed off, there can be a seamless transfer of information to accounts and payroll departments to enable salary payments to be made.

Personnel Manager is available as a 'cloud-based' solution or on any VetStation; or it can be a stand-alone product or integrated into Spectrum.

The key to improving business efficiency and saving countless hours of management and staff time is to move to digital working-hours recording.

Rota Manager, especially when combined with Personnel Manager, provides an effective easy-to-use solution for planning, designing and managing customised staff rotas, staff hours and salaries. ■



For a complete solution, matched to your needs, contact AT Veterinary Systems:

enquiries@vetsystems.com | 01359 243 400

Designed and produced by  AT VETERINARY SYSTEMS
www.vetsystems.com



John Hill
MVB MRCVS

John qualified from Trinity College, Dublin, in 1975, and recently retired as senior partner in a six-vet, mixed practice in County Antrim, Northern Ireland. He is currently a trustee of the Pet Blood Bank and is the founder president of the recently formed British Bee Veterinary Association set up to raise knowledge of bees within the profession. He also sits on the Bee Health Advisory Forum, which advises ministers and politicians on bee policy, and is an enthusiastic beekeeper himself.



*Suggested Personal & Professional Development (PPD)



BEES

Varroa mite – the beekeeper's nightmare

There are many mites that infest bees, but only a few are pathogenic. Invasive species can cause havoc in any new environment into which they happen to fall – none more so than the migration of a small, maroon-coloured mite called *Varroa destructor* on to the western honeybee, *Apis mellifera*.

Our story begins with the eastern honeybee, *Apis cerana*. This is a smaller, more hairy, bee than *Apis mellifera* and has a slightly shorter life cycle. Colonies of western honeybees have, historically, been moved around the world because of their fecundity and good honey production, and many colonies arrived in the Far East and were in close proximity to *Apis cerana*.

At some point, about 50 years ago, a mutation took place and the mite *Varroa jacobsoni* jumped species from *Apis cerana* to *Apis mellifera*. The mite has subsequently been re-named *Varroa destructor* – which has proved to be an appropriate title as it has spread round the world very rapidly and is present in all countries, except Australia.

Apis mellifera has little natural defence against this mite. It has less hair and a longer life cycle, which both favour the mite. *Varroa destructor* has an oval-shaped carapace and measures approximately 1.8 x 1.4mm – about the size

of a full stop (**Figure 1**). It sucks the bee's blood – called haemolymph – which is a straw-coloured liquid with few cells.

Mites parasitise both the adult bee and developing pupae. They are large in relation to the size of the bee – in fact, they have one of the largest parasite-to-host ratios in nature. If a bee was the size of a human, the mite would be the size of a dinner plate crawling over you sucking your blood and injecting you with viruses. It is amazingly adaptable too and is even capable of changing the biochemical structure of its carapace to match that of its host so that the bee does not recognise the intruder.

Interlocked life cycles

A worker bee starts off as an egg for three days, hatches into a larva that grows rapidly until day nine when the cell in which it is developing is capped over with wax. The larva changes to a pupa around this time and from then undergoes metamorphosis, changing

into an adult worker bee and emerging, fully formed, at day 21. The drone has a similar cycle, but longer by three days and emerges at day 24 (**Figure 2**).

The life cycle of *Varroa* is closely linked to the life cycle of the bee. An adult female mite enters the cell just before it is capped. The mite immerses itself in the pool of liquid feed, 'royal jelly', at the bottom of the cell which the larva feeds on and then covers itself to avoid detection by the worker nurse bees. It does not drown because it has an appendage called a peritreme that acts as a snorkel allowing it to breathe.

When the cell is capped with wax, the mite moves after about four hours and begins to feed on the immature bee. It punctures the pupal skin with its powerful mandibles and this feeding site allows her and her offspring to feed. The puncture wound stays open and does not heal.

After 60 to 70 hours, the mite lays her first egg, which is



Figure 1. An adult *Varroa* mite (Source: Crown Publications).

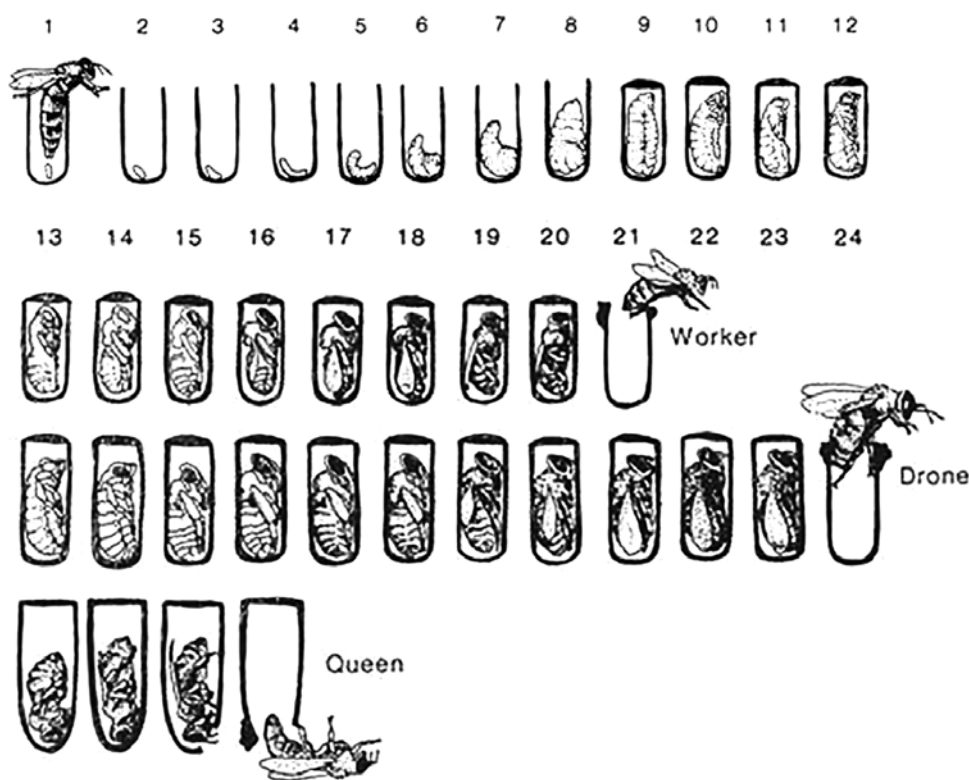


Figure 2. The life cycle of honeybees in a hive.

always male. Every 30 hours after that she lays an egg that becomes female and will lay five to six eggs in total. The male mates with these females within the cell. This inbred system – with brother mating with sisters – is a common strategy in many mite species.

The developing mite goes through two juvenile stages, protonymph and deutonymph, before becoming an adult. The time required from egg to adult for a male is five to six days and six to seven days for a female. The female mites must be fully formed by the time the adult worker emerges at day 21. Any immature females and the male die when the adult bee leaves the cell; however, the viable mother and new daughters move out of the cell and enter a fresh one to find a new larva.

Varroa mites favour drone cells because the life cycle of drones is three days longer than that of workers. The drones secrete a pheromone which is attractive to mites that will, preferentially, move to a drone cell. During the summer, the mites live for about two to three months, so they can, therefore, potentially complete several life cycles. Winter mites live much longer on adult bees that are in a cluster for overwintering and will re-enter brood cells when the queen resumes egg laying in late January and February. The mites will live on the adult bees and are known as phoretic mites.

The mites have effects on the individual bee and on the colony as a whole too. Individual bees suffer from loss of haemolymph; although they have some resilience if

infested with only one mite, if compromised by several mites then they will be weakened, have lowered resistance and a shorter life span.

Spread of disease

Varroa mites transfer viruses that are injected into bees via the bite wound. The most common virus spread in this way is the deformed wing virus (DMV), which leads to the adult bee having shrivelled wings and an inability to fly (Figure 3). This appearance of deformed wings indicates that an individual bee is highly viraemic, will have stunted growth, be weak and will die early.

Many other viruses can be associated with the *Varroa* mite and leave infected bees more open to effects of other diseases, such as acarapiosis caused by the tracheal mite, *Acarapis woodii*.

Whole colonies are affected by the exponential rise in mite numbers. Honeybee



Figure 3. *Varroa* mites transfer the deformed wing virus (DMV) which leads to the adult bee having shrivelled wings and an inability to fly. (Source: Crown Publications)

numbers rise very rapidly in the spring and peak in mid-June at around 45,000 to 50,000. From then, on the numbers of workers steadily decline until winter, when they are around 5,000 to 6,000. So, if mites are not checked, then there will be many more mites than bees in the autumn and the colony can be overrun and collapse rapidly within a few weeks, even for what outwardly seemed like a strong unit.

A dwindling colony poses a threat to neighbouring colonies because many bees may abscond from a weakening hive and enter these adjacent hives and take the *Varroa* mite with them. Drones are much more able to 'drift' into adjoining hives as they are more readily accepted than 'drifting' workers.

What are the signs of colony collapse?

There will be a sudden reduction in the adult population, and many bees will have deformed wings and stunted abdomens. It will be possible to see phoretic mites on remaining workers and drones. The 'brood pattern' will be poor with patches of dead brood discoloured and remaining bees trying to remove them.

It is difficult to set a threshold beyond which the *Varroa* mite population has a more pathogenic effect. A

"The life cycle of *Varroa* is closely linked to the life cycle of the bee"

“Varroa mites favour drone cells because the life cycle of drones is three days longer than that of workers”

level that is catastrophic to one hive may be tolerated better by another colony. Much depends on the virus load, other pathogens and food levels.

It is reckoned that the if the mite population in a hive rises above 1,000, then the colony is in trouble. **Figure 4** shows how, if the level is low the mite population may not

reach 1,000 within a season; however, if higher at, say, 200 initially, then the numbers might reach over 1,000 in less than 90 days. This could be accelerated by an invasion of absconding bees from another hive.

As mentioned earlier, *Varroa* mites have a predilection for drone brood; but why should a drone cycle that is only

three days longer than that of a worker bee be so beneficial to the life cycle of the mite? Research has shown that, on average, 1.45 adult viable mites emerge from a worker cell on day 21. The average number that emerge from a drone cell is 4.15 mites. All these mites move into new cells to start the breeding cycle again.

So, after five cycles, the number of mites from worker cells is $1.45 \times 1.45 \times 1.45 \times 1.45 \times 1.45 = 6.4$ mites; whereas the number from drone cells is $4.15 \times 4.15 \times 4.15 \times 4.15 \times 4.15 = 1,230$ mites. It is clear to see that drone cells

favour the greater production and survivability of the mite.

The eastern honeybee, *Apis cerana*, has a shorter life cycle and this is one of the evolutionary factors that allowed it to tolerate *Varroa jacobsoni*. In 1992, *Varroa destructor* arrived in Devon and spread rapidly through the British Isles (**Figure 5**). Although it was listed initially as notifiable, it soon became obvious that this status was unsustainable. There are a few isolated pockets where it has not gained a foothold – such as the Isle of Man, some Hebridean islands and remote valleys in County Donegal. Manx beekeepers decided collectively not to import bees to the island, yet there was a scare a couple of years ago.

Although Australia has managed to stay free of *Varroa destructor*, the mite, *Varroa jacobsoni*, has been found in some *Apis cerana* colonies.

Practical control measures

Varroa mites are ubiquitous and they are impossible to eradicate, especially as their life cycle is so closely linked to the bee life cycle (**Figure 6**). The beekeeper has to learn to live with the pest and constantly devise ways of keeping the mite numbers below a threshold of 1,000. Frequent thought must be given to reduction of the mite population throughout the entire year, and the beekeeper can employ different methods to try to assess the number of mites at certain times of the year.

Treatment can be by so-called ‘hard’ chemicals and biotechnical methods. Insecticides, such as the fluvalinates, were used initially in the form of impregnated strips placed between the frames. These worked very well at a 99 per cent efficacy level for about 10 years, until resistance built up gradually making them much less effective. Thymol products

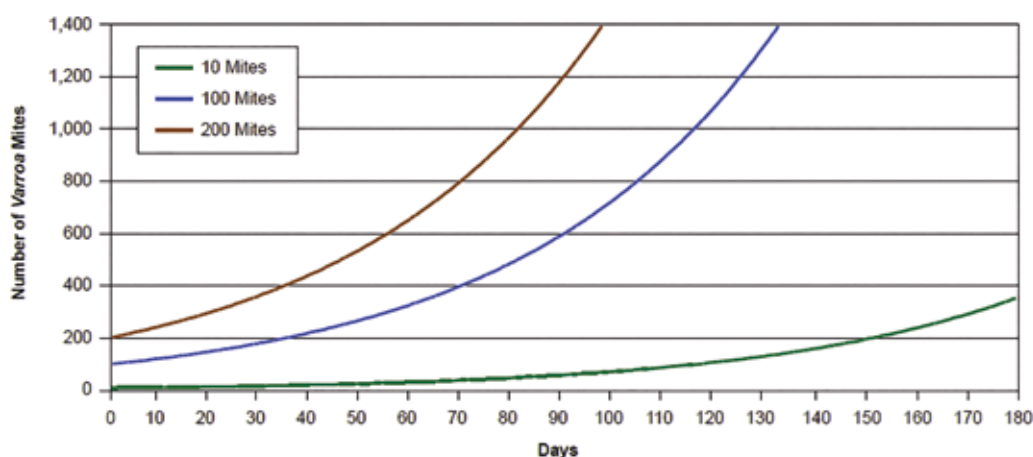


Figure 4. The effect of initial mite numbers on subsequent population growth (Source: Crown Publications).

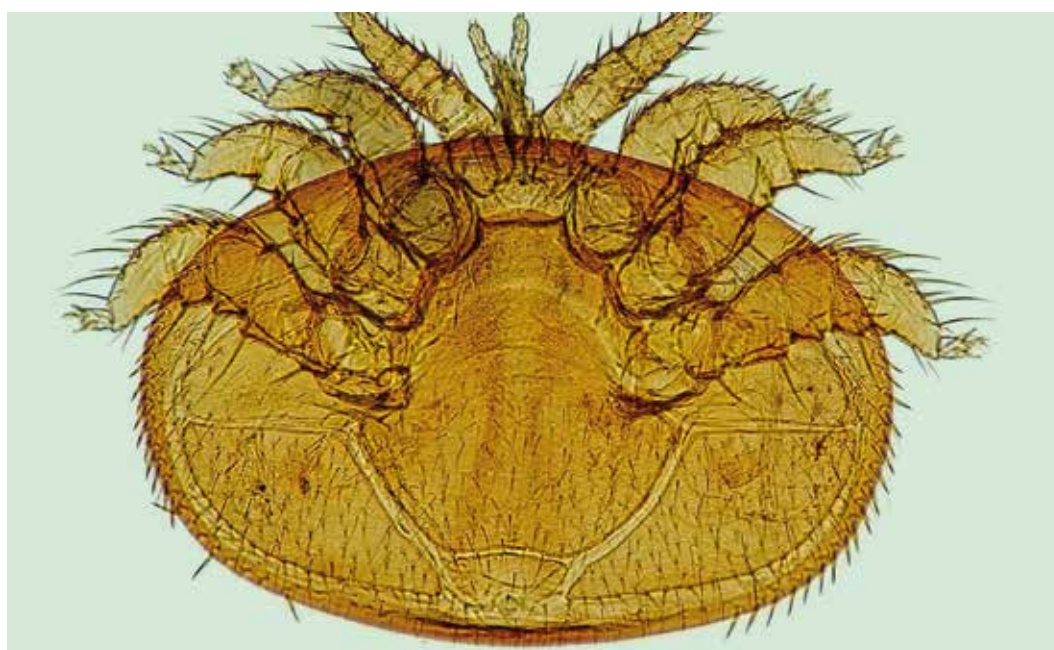


Figure 5. *Varroa* mite as viewed under the microscope.

and organic acids have been used, but caution is required when the honey flow and supers are used. Many of the products cannot be used if the honey supers are on the hive for the honey harvest.

Treatment with the 'hard' chemicals must be restricted to certain times of the year in order to avoid contamination of the honey. Biotechnical methods are those that use methods which upset the mite's life and they are not reliant on hard chemicals.

One method is to sprinkle icing sugar generously over bees on the frames. This induces frantic grooming behaviour, which helps to knock the mites off the bee. The floor of the hive has a metal grill/mesh structure which allows the mites to fall

"The beekeeper has to learn to live with the pest and constantly devise ways of keeping the mite numbers below a threshold of 1,000"

through and they are unable to return to the bees.

A shallow super frame can be placed in the brood chamber and this encourages the bees to produce drone comb under the bottom bar of the frame. The mites are attracted to this new drone comb and once the cells are sealed they are trapped and can be removed and destroyed.

Conclusion

The emergence and spread of *Varroa destructor* is linked to human activity and the consequences have proved a

major challenge to honeybees and beekeepers.

The mite has devastated wild colonies that were a major gene pool for the managed colonies. There is some evidence, however, that the wild population is showing signs of recovery and we can hope that this will continue. ■

Reference

Animal & Plant Health Agency
(2017) Managing Varroa.
www.Defra_Managing_Varroa_2017_WEB_version_.pdf



Figure 6. Varroa mite on the back of a bee.



Steve Unwin

BSc BVSc DipECZM(ZHM) MRCVS

Steve graduated from Massey University in New Zealand in 1993 with a science degree majoring in physiology and ecology; and then, in 1998, with a veterinary science degree.

Between 1997 and 2003, he worked in several zoos, wildlife rehabilitation centres and conservation projects in Australia, Thailand and Cameroon. Since 2003, he has been a veterinary officer in the Chester Zoo animal health team.

Steve is a recognised specialist in Zoo Health Management as a Diplomat of the European College of Zoological Medicine.

He was the veterinary co-ordinator for the Pan African Sanctuary Alliance veterinary programme and is currently co-facilitator for the Orangutan Veterinary Advisory Group. Both these organisations focus on and promote capacity building of local primate and wildlife veterinarians.



**Suggested Personal & Professional Development (PPD)*



SPECIAL ROLES

Day in the life of a 'zoo vet'

Although classed as a speciality (European College of Zoological Medicine: Zoo Health Management, www.eczm.eu), a zoo vet's job is extremely generalised – yet in a very specific way!

When starting out in this speciality, the sheer variety of species with which you are having to work (Figures 1 & 2) can be both challenging and overwhelming (Figures 3 & 4). However, by combining knowledge and first principles of physiology and anatomy with shared information gleaned via an incredibly supportive discipline and a growing literature base, our work is increasingly becoming more clinically and scientifically rigorous.

Sources of information

In a previous article [VPT March/April 2017, 5(2): 56-59.], I highlighted how the sector is very good at information exchange and skill-sharing on an international basis (Figure 5).

Typical day

As veterinary professionals working in the zoo, we – along with the curators, keepers, applied scientists and other trained personnel – are jointly responsible for the health and welfare of the species in each zoological collection. To illustrate a typical day, I have picked, at random, my diary entry for Wednesday, 16 November 2016 (Table 1).

Current focus

We currently have two main areas of focus in our work: the importance and methodology of a parasite surveillance programme within a zoological collection and the development of a concentration test for faecal parasite investigation.

Parasite surveillance programme

Two purposes of zoos are to breed rare and endangered species to help protect them from extinction, and

to provide as natural an environment as possible to assist in our educational role, whilst also enabling species to exhibit their 'species-natural' behaviours. While this can sometimes be achieved with artificial devices that mimic particular functions of the animals' natural environment, we do aim for as 'naturalistic' enclosures as possible.

These naturalistic environments often include multi-species situations and, unfortunately, an all-too-frequent inability to rotate pasture or set stock. Both these factors lead to a need for an intensive parasite surveillance programme. This is not just to protect the health of the animals involved – many wild animal species may carry parasites

"When starting out in this speciality, the sheer variety of species with which you are having to work can be both challenging and overwhelming"



Figure 1. Elephant fish (Photo: Steve Chester).



Figure 2. Elephants.

pathogenically benign in themselves but potentially lethal in other species. Some also have zoonotic potential.

Good parasite surveillance starts with effective sample collection. Staff are trained to collect

samples from a random series of defecations every day for three days in a row (occasionally five days depending on the parasite of concern) for pooling. Many nematode species only shed eggs intermittently, so by collecting multiple

samples we are increasing the sensitivity of the test. These samples are properly labelled with species, ID numbers and dates of collection.

Staff are also well trained to recognise the normal

appearance and frequency of faeces on a species-specific basis. Abnormal faeces are collected in the same manner – but separately. We always run direct preparations in fresh samples, but the follow-up testing – using McMasters,



Figure 3. Clinical challenge – anaesthesia of an anteater for endoscopy.



Figure 4. Recognised disease processes, seen in domestic animal medicine, occur in zoo species as well – so first principles stand you in good stead. An example might be arthritis assessment – this case just happens to be a penguin.

Industry-wide online and sharable records system

- International database, ZIMS, <https://zims.species360.org/>

Industry-specific legislation

- Zoo Standards, www.gov.uk/government/uploads/system/uploads/attachment_data/file/69596/standards-of-zoo-practice.pdf
- European Zoos Directive, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1999:094:0024:0026:EN:PDF>
- Animal Welfare, www.legislation.gov.uk/ukpga/2006/45/contents
- International trade, <https://cites.org>

Scientific literature

- *Journal of Zoo and Wildlife Medicine* (official journal of North American and European zoo vet associations) <http://zoowildlifejournal.com>
- *Journal of Wildlife Diseases*, www.jwildlifedis.org
- Zoo and wildlife medicine (reviews and current therapy) such as the Fowler and Miller series of texts.

Figure 5. Information sources for veterinary professionals working in zoos.

Table 1. 'Day in the life of a zoo vet'

Species	Topic	Task	Outcome
Epulette shark <i>Hemiscyllium ocellatum</i>	Movement of animal	Pre-export check	Visual examination and review of clinical notes to confirm no external evidence of infectious disease or traumatic injury and declare fit for transport. Discuss with team method and length of transport, and receiving collections facilities. Confirm a BIAZA member otherwise a husbandry and veterinary pro forma is required, www.biaza.org.uk
Cabot's tragopan <i>Tragopan caboti</i>	Clinical case	Conscious examination	Conspecific aggression causing feather loss. Bacterial and fungal culture samples taken to confirm no underlying infection. Birds separated for monitoring and follow-up as needed. Await results and revisit.
Cotton-top tamarin <i>Saguinus oedipus</i>	Clinical case	Keeper consultation	Intermittent epistaxis confirmed in this animal (currently clinically normal). Discussed history with keepers to assess patterns and develop a differential and plan.
Columbian black spider monkey <i>Ateles fusciceps rufiventris</i>	Clinical case	Visual examination	Confirmed conspecific aggression. To discuss group dynamics with curators. Decided against medication at this stage – preferential treatment might make situation worse, but to monitor for infection.
Panther chameleon <i>Chamaeleo pardalis</i>	Clinical case	Conscious examination	Trauma – right eye confirmed. Pain relief provided. To monitor daily.
Mountain horned dragon <i>Acanthosaurus capra</i>	Herd health	Herd review	Infectious disease management:– nematode worming (see body copy of article for expansion)
Grosbeak starlings <i>Scissirostrum dubium</i>	Herd health	Visual examination	Free-flight, multi-species aviary – looking fluffed. Investigate flock dynamics and faecal parasitology as first step. Followed up with liver biopsies confirming haemochromatosis and revision of diet.
Galapagos tortoise <i>Geochelone nigra</i>	Staff training/ animal welfare	Animal training for veterinary procedure	Training for conscious blood sampling to minimise stress in both animal and handler, and avoid necessity for anaesthetic.
N/A	CPD	Journal Club	As we run an ECZM residency, monthly journal clubs are held to keep up to date with the latest developments.
Multiple (all taxa)	Health audit	Review recent post-mortems	Collate recent post-mortems to assess trends and in preparation for next quarterly audit.
Multiple (amphibians)	Herd health	Keeper query	Several species of frogs need moving to an enclosure previously positive for mycobacteriosis – request to assess risk and comment on plan.

Baermann's and faecal concentration techniques – will depend on the host species and the parasite group for which we are searching. Flotation is never used because of the poor sensitivity of the test for many of the parasites in which we are interested.

The majority of species are monitored on a 'test-and-treat' programme. Specific worming protocols are formulated for known

issues in specific species and situations, confirmed from the sampling surveillance. These protocols are reviewed at least annually.

Concentration test for faecal parasite investigation

This method, using ethyl acetate media, is simple and accurate for investigating all helminth and protozoal parasites, yet is still not widely used in veterinary practice. It is a good

screening test, successfully detecting all parasites found with saturated salt or zinc sulphate flotation (Cheeseborough, 2005). The equipment required is listed in **Figure 6** and illustrated in **Figures 7** and **8**.

Always wear gloves. Add 10ml of formal saline 10 per cent to the flat-bottomed tube in the kit, add one level 1g spoon of fresh faeces, and mix thoroughly with the wooden stick until there are no visible lumps of faecal material. If the sample is very hard, leave it to stand for a while. Place the white lid and shake the sample vigorously. The sample can be stored, if necessary, for later analysis if there is nowhere on site to run this immediately.

Ensure the FPC strainer is securely attached to the 15ml centrifuge tube – it should be central on the vent-straw. Remove the white lid and attach the FPC strainer tightly to the flat-bottomed tube.

Shake vigorously. Invert the tube, pointing the conical end of the centrifuge tube downward, and shake the specimen through the strainer – if necessary, tapping the flat-bottomed tube to encourage the sample through the strainer.

Unscrew the FPC strainer and flat-bottomed tube, add approximately 1mL of ether or ethyl acetate to the sample in the centrifuge tube. Replace the white lid and shake

"...many wild animal species may carry parasites pathogenically benign in themselves but potentially lethal in other species"

vigorously. If no centrifuge is available, this sample can be left to settle for a minimum of one hour.

If using an electric centrifuge, run the sample for one to two minutes at around 1,500 to 3,000rpm, or hand centrifuge for two minutes at about 90rpm. Dispose of the supernatant from the centrifuge tube and add a few drops of formol saline 10 per cent, or physiological saline to the sediment and mix thoroughly.

Add one drop of the sediment/formol saline mix to a microscope slide, place a coverslip over it and examine under a microscope. Scan the slide at a magnification of x10, then use x40 for further investigation/confirmation of ova/cysts or larvae. ■



Figure 7. Components of the Evergreen FPC kit.

- fresh faecal sample
- 10% formol saline
- 15ml flat-bottomed tube and lid*
- 15ml centrifuge tube*
- 1g plastic spoon*
- FPC strainer*
- wooden stick
- plastic Pasteur pipette
- ether or ethyl acetate
- gloves
- microscope slides and coverslips
- centrifuge (hand-powered suitable if no access to electricity)
- microscope

*Commercially available in Evergreen FPC kit

Figure 6. Equipment required for faecal concentration test (using ethyl acetate media).



Figure 8. Hand-powered centrifuge – can be used in areas without power, to spin down blood, urine, as well as faecal samples.

Reference

Cheesborough M (2005). *Parasitological Tests. In District Laboratory Practice in Tropical Countries: Part 1 (2nd edn)*. Cambridge University Press, Cambridge pp.196-198; or to download a pdf of the entire book, <https://medicallabtechno.weebly.com/uploads/7/5/1/5/7515789/monica-cheesbrough-district-laboratory-practice-in-tropical-countries-part-1.pdf>

Wildlife emergencies – what to expect at this time of year

Simon Cowell, CEO of the Wildlife Aid Foundation, writes...



A long, hot summer may be welcomed by we humans, but for wild animals it brings a range of challenges.

After a prolonged period of dryness, we can expect to see an increase in cases of malnutrition, particularly in mammals such as hedgehogs and badgers, which find much of their diet in the earth. After weeks or months of limited rainfall, they struggle to dig down into the hard ground – the problem being worse for the young that do not have as much strength. At this time of year, many hedgehogs will be having second broods and these young will struggle in such dry conditions.

Many hedgehogs have two litters of young through the year – first in the spring and then again in the late summer and early autumn. These latecomers face a host of hurdles and, although the weather is usually mild at this time of year, it is always a race for them to put on enough weight to see them through winter hibernation. A lack of food will not help and many of those that struggle could end up in veterinary practices. The golden rule is *never* to give them milk and bread.

At the Wildlife Aid Foundation*, we do not advise that the public put food out for wild animals unless there is an emergency – during a long spell of particularly cold weather, for instance. The reason for this is that some wild animals will start to rely

on an easy source of nutrition and soon lose their fear of humans, which will have disastrous consequences.

Malnutrition will most likely present itself as dehydration – the simple test for which is to gently hold and raise a pinch of flesh. If it doesn't go back down easily, the animal is dehydrated. If you do have to feed a hedgehog, badger or fox, use meat-based cat or dog food and not fish, because fish would not be part of their natural diet.

With the arrival of autumn, we shall continue to see injuries sustained through gardening as people tidy up leaves with rakes, which can cause nasty injuries to animals hiding in leaf piles. As the sun gets lower in the sky and the days become shorter, we also expect to see more animals injured in road traffic accidents.

Deer are particularly difficult to treat. Roe deer suffer from 'capture myopathy', which is often fatal; and even if an injured deer can be taken for treatment, rehabilitation is difficult. They do not react well to periods of captivity and, if they have broken limbs, sadly, euthanasia is often the most humane course of action.

I would advise any veterinary practice presented with a wild animal to contact a local wildlife hospital for advice if they're unsure of what to do.

Earlier this year we launched an awareness campaign to help improve outcomes for wild animals taken to commercial veterinary practices. Just a few easy steps can make all the difference.

We've summed the process up in an easy-to-remember acronym:

W – Wildlife centre: have the details of your local one available and call for advice
I – Information: glean as much as possible about the animal and the circumstances in which it was found
L – Location: where the animal was found; be as precise as possible
D – Details: take contact details for the person who found it.

Many of the wild animals that end up in veterinary practices can be returned to the wild very quickly. However, to do this properly, wildlife centres need to know details of where the animal was found and the circumstances in which it was discovered. ■

** The Wildlife Aid Foundation (WAF), www.wildlifeaid.org.uk, promotes close co-operation between veterinary practices and wildlife charities that can offer rehabilitation and ongoing treatment following emergency triage.*

Nellie the elephant was the lucky one

We pity the poor circus elephant crouching with all four feet on a tiny platform and being made to stand on its hind legs for public entertainment; but there is now a new focus on how we continue to harm and humiliate these wonderful creatures.

A World Animal Protection (WAP) report, *Taken for a ride*, has reported that the rise in 'wildlife tourism' is leading to a huge increase in the number of elephants being kept in cruel and unacceptable conditions. The study of some 3,000 captive elephants revealed that three out of four are living in poor and unacceptable circumstances.

When not giving rides or 'performing', the elephants are bound by chains less than three metres long, day and night, and kept on concrete floors close to loud music, crowds and roads. They experience very little social interaction with other elephants, are fed poor diets and have no access to proper veterinary care.

Elephants are intelligent, socially developed animals forming complex hierarchies within herds and these conditions go against their most basic needs – often leading to behavioural problems, chronic diseases and shortened lives.

Blinkered ignorance

The WAP report surveyed venues in Thailand, Laos, Cambodia, Nepal, Sri Lanka and India. In Thailand alone, there has been a 30 per cent increase in the number of captive elephants in just five years. Dr Jan Schmidt-Burbach, a global wildlife and veterinary adviser at WAP is quoted as saying: "The cruel trend of elephants used for rides and shows is growing" and that "There is an urgent need for tourist education and regulation of wildlife tourist attractions worldwide. Venues that offer tourists a chance to watch elephants in genuine sanctuaries are beacons of hope that can encourage the urgently-needed shift in the captive elephant tourism industry."

So just when we thought that perhaps the numbers of animals – including elephants used in circuses – were declining, we humans have found another way to cause them distress.

Today most of us would agree that using wild animals in circuses is no longer acceptable; but although the practice is banned in many countries, globally, thousands of wild animals are still forced to perform demeaning and unnatural



tricks to entertain the public. Animals are often made to perform 'stunts' and 'humanised' behaviours that are completely against their nature. Parrots riding bicycles, elephants standing on their heads or walking a tightrope, chimpanzees smoking cigarettes, and tigers jumping through hoops of fire are just some of the examples.

Missed opportunities

In the UK, the Wild Animals in Circuses (Prohibition) Bill 2016-17 was to go before parliament on 12 May this year for its second reading. The bill proposed the banning of all wild animals in circuses in England and Wales but did not legislate for Scotland or Northern Ireland. Sadly, owing to the calling of the general election, Parliament was dissolved on 3 May resulting in the fall of the bill. Consequently, no further action will be taken in the near future. This means that there will still be circuses touring Britain with wild animals such as camels and reindeer and a small number still displaying lions and tigers.

The last circus elephant in Britain was retired and transferred to Longleat Safari Park in Wiltshire in April 2011 after an exposure showing ill-treatment by circus staff. However, elephants are still used in circuses worldwide and continue to perform the same old tricks for human 'entertainment'. This is surely unacceptable in our so-called 'modern' society and can only undermine public respect for the natural world, as well as respect for a society that still accepts such practices. Indeed, it can be argued

that it undermines our own self-respect as a caring species responsible for the stewardship of the Earth's natural history.

Whether it is for circus or tourist entertainment most elephants experience intense periods of trauma in the process of making them 'fit for captivity'. Many are separated from their mothers in the wild and undergo what may be considered a brutal period of training to "break their spirits" and make them mild enough to carry tourists and perform.

Two-faced tourists

For many tourists, riding on an elephant sounds like quite an attractive 'holiday experience' and would not be considered in the same light as watching an elephant in a circus.

Despite conservation efforts, Thailand has seen a 30 per cent increase in elephant entertainment venues – from circus performances to riding or bathing with elephants. As many as 40 per cent of tourists visiting Thailand were reported as saying that they had been on – or were planning to go on – an elephant ride. This translates into a demand for around 12.8 million elephant rides per year.

As the 1950s song goes, 'Nellie the elephant packed her trunk and said goodbye to the circus'. Nellie was lucky. Pity the poor elephant giving tourists rides in South East Asia.

Reference

www.worldanimalprotection.org



Hilary Orpet
MScVetEd BSc Dip AVN(Surgical)
Cert EdFHEA DipCABT RVN

Hilary is a senior lecturer on the Foundation and BSc Veterinary Nursing Degrees at the Royal Veterinary College, London.

In 2007, she developed the Ability model of nursing care with Andrea Jeffery, which is currently the only published veterinary model of care in use. She completed her MSc in Veterinary Education in 2011.

Hilary currently sits on the Veterinary Nursing Council at the RCVS.

Reflective practice – why it matters

In the fast-paced, digital world in which we live today, it is hard to see where reflection can find a place. Within a few clicks we have access to a wealth of information which, in the past, we would have needed time to browse through several textbooks to find the answer.

We expect everything to happen immediately and, in the unpredictability of veterinary practice, we are expected to think on our feet. So, taking time out to consider our actions, to reflect on how we might improve our practice, don't tend to be things high on the agenda as we crawl into bed at the end of a busy working day.



As veterinary professionals, we are required to maintain our knowledge and skills by undertaking regular continuing professional development (CPD). Often this is completed as a 'box-ticking' exercise, with little thought as to how it might help our overall professional development and improve our practice.

The Royal College of Veterinary Surgeons (RCVS) is proposing a new structure for veterinary professionals to use in their approach to continuing professional education. Rather than completing CPD for the sake of recording the hours, a framework has been suggested based on outcomes. This is designed to focus the selection of CPD and to consider what knowledge and skills have

been gained and how they will benefit us in practice (May & Kinnison, 2015).

This article will look at defining reflection, how we can utilise this in our continued lifelong learning and suggest ways in which we might benefit from spending some of our busy lives reflecting on what we do whilst meeting our professional requirements.

What is reflective practice?

Reflective practice, in its simplest form, is the process whereby you 'stop and think' about what you do. The idea being that this greater

understanding of what you do will inform future practice (Sandars, 2009). Burns and Bulman (2000) suggest that reflection is a useful learning tool, that encourages critical analysis, helping us to interpret what we do in order to improve. It is the process of learning through and from experience, thereby gaining new insights of 'self' – and/or – our own 'practice'.

Know thyself...

'Self-awareness is the foundation skill upon which reflective practice is built. It underpins the entire process of reflection' (Burns & Bullman, 2000).



**Suggested Personal & Professional Development (PPD)*



"If someone was describing you to another person – what would they say?"

In order to reflect effectively you need to be self-aware. Knowing how you may react in different situations is part of the analysis. The way we may act or react in a particular situation is often guided by our own internal beliefs about how we feel we should behave. These personal 'values' are about what is important to us.

Do you know what your own values are, and are other people aware of them? If someone was describing you to another person – what would they say? We can often identify our values by our reaction to what another person says or does to us. A strong emotional reaction is often because what has been said or done either goes against our values or closely aligns with them. Being self-aware is about being able to acknowledge how we may have affected a particular situation and also how that situation may have affected us (Burns & Bulman, 2000). Yes, reflection is about feelings.

Learning from reflection

Reflection has been taught within the human-centred medical curricula for many years and is now becoming more prominent in veterinary medicine – specifically in the RCVS Certificate in Advanced Veterinary Practice (CertAVP) (May & Kinnison, 2015). In veterinary nursing, students are taught about various models that can be used as a framework to guide the reflective process. As a large part of veterinary nursing education is learnt through experience and practical placement within the clinic, reflection is an essential part of integrating theory and practice.

On a daily basis, we often consider what we could have done differently – whether it is wishing we had taken a different route to work to avoid traffic jams, or how we could be more efficient



Figure 1. Gibbs (1988) reflective cycle reproduced from Burns & Bulman (2000).

in ordering stock. As an educator, there are many times when I have considered how I might structure a lecture differently next time, especially if I felt the session didn't go so well.

These thoughts might come to us at the time or, often, later when walking the dog or driving home. Whilst this might be considered as reflection, our thoughts are often fleeting and usually pushed away by current needs of what to cook for dinner that night or how to schedule the mounting list of procedures for the next day.

To learn fully from reflection, it is important to be able to analyse our thoughts in more detail. Burns and Bulman (2000) describe how keeping a journal helped them to identify common issues and how they were then able to consider what changes needed to be made in their nursing practice. Keeping a

daily journal might seem a chore to some, but various students on the CertAVP course stated that it had helped them to identify gaps in their knowledge base (May & Kinnison, 2015).

This type of retrospective reflection was described by Donald Schön (1983) as 'reflect-on-action'. Being able to reflect on action is a defining characteristic of a profession (Schön 1983 in Burns & Bulman, 2000) and if we are to progress the profession utilising current evidence, then we need to be more aware of what we do and why we do

it. While it is important to reflect on action (after the event happened) it is equally important to be able to reflect in action (during the event) so that immediate changes may be made.

Reflective models

Using a framework can help us to focus our thoughts. The models generally follow the same themes – describe the event, analyse the event and then consider what changes need to be made to move forward. Gibbs (1988 in Rolfe et al, 2001) suggested a model that closely resembles the work of Kolb's experiential learning model (Figure 1).

"While it is important to reflect on action (after the event happened) it is equally important to be able to reflect in action (during the event) so that immediate changes may be made"

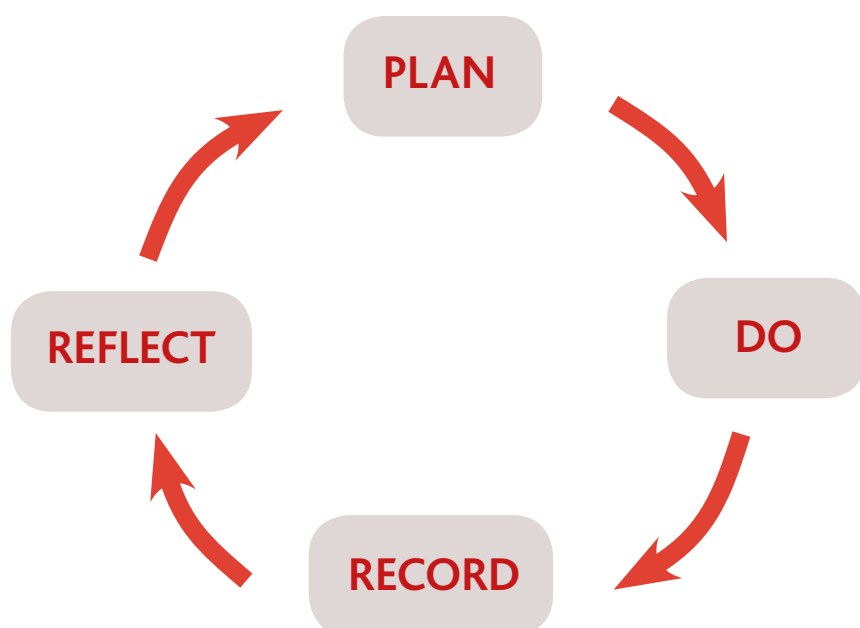


Figure 2. Outcomes-based model for CPD.

Borton's Developmental Framework (1970 in Rolfe et al, 2001) provides a simpler structure that involves asking three questions:

- what happened?
- what am I to make of this?
- what can I do differently next time?

This model is perhaps an easier framework to remember in a busy clinical practice.

Solving the theory-practice gap – mentors and preceptors

The theory-practice gap has been described in the nursing literature as the lack of connectedness between what is learnt in the classroom and how this is translated into practice (Rolfe et al, 2001). This applies equally to research, where it is often assumed that the research ends when the paper is published, and little of the new-found knowledge is then applied in practice.

There is also criticism of academics and researchers in education who may lack more recent clinical experience and who are, therefore, unable to relate the theoretical concepts to practical application in the clinic – thus widening the gap (Rolfe et al, 2001).

The role of the preceptor in nursing is someone who can act as the 'critical friend' – helping the newly graduated professional understand the issues with which they may be faced in clinical practice and relating back to the theory they have already studied (Duffy, 2009). In addition, their role is to support the newly qualified practitioner to make the transition from student to professional, helping to develop their practice through reflection. The mentor plays a similar role in guiding students to develop their reflective skills within the practice environment.

O'Donovan (2005) identified three categories affecting reflection in clinical placement:

- understanding the process of reflection
- using reflection in clinical practice; and
- needing support and guidance to aid the reflective process in clinical practice.

In her study, the students identified that having a mentor to discuss and help them critically reflect on an incident aided their understanding of the process. As veterinary professionals, reflection is an important part of our continuous professional development.

Outcomes-based CPD

Continuing professional development is not only a requirement by the regulatory body, but it also demonstrates the individual's commitment to maintaining his or her knowledge and skills to provide high quality patient care. Traditionally, this has been input-based by collecting hours or points. More recently there has been

a move towards measuring the outcome of completing this additional learning (Wallace & May, 2016) and the effect on improving patient care.

In 2016, the RCVS held a six-week consultation on CPD with the profession, asking for its views on a proposal for an outcomes-based approach to CPD, which would concentrate less on hours logged and more on interactive, reflective learning and measuring the impact that CPD has on the individual's practice and patient health outcomes (Figure 2).

The four key components of the outcomes-based model are to:

- plan – identify your CPD needs using a development plan. Where are the gaps in your knowledge base?
- do the CPD – remember there are a multitude of ways to complete your CPD. Which will be the most appropriate to achieving your objectives in your development plan?
- record – keep CPD certificates, notes and utilise the RCVS Professional Development Record (www.rcvs.org.uk/education)
- reflect – what have you learnt? How did the CPD enable you to improve your practice?

By utilising the model you will, as a matter of course, plan and evaluate your CPD in line with your identified needs and goals. This will, in turn, enable you to utilise daily practice life to reflect on your achievements and be able to develop professionally – recognising that your needs change as your career progresses.

The RCVS consultation exercise revealed that many participants were concerned about the amount of additional paperwork involved, thinking that they would not have time to write

"... there's an application for your smart phone (CPDVet), developed specially for you to plan and record your CPD!"

a reflective essay every time. This is not necessary – all you need is just a few lines to trigger your thoughts at a later date when you want to make changes.

Human medical doctors and nurses now have to go through a process of revalidation (www.rcseng.ac.uk; <http://revalidation.nmc.org.uk>). Nurses (every three years) and doctors (every five years), go through a process to ensure they are up to date and fit to practise. This involves keeping a portfolio of evidence – including evidence of CPD and also feedback from patients. This is something that may be developed for veterinary professionals in the future.

And finally...

So, next time you are sitting in a lecture hall or relaxing at home listening to a webinar, perhaps you should ask yourself the following three questions:

- how did this CPD relate to my learning needs and objectives?
- what did I learn from this CPD activity? The 'take home message' – not reams of illegible scrawl!
- what changes will I make as a result of this CPD? What are the key messages I would like to discuss with the practice team the following day?

And if you want more immediate access ... there's an application for your smart phone (CPDVet), developed specially for you to plan and record your CPD! ■

References

- Burns S and Bulman C (2000). *Reflective Practice in Nursing. The growth of the Professional Practitioner*. Blackwell Science. Oxford
- Duffy A (2009). Guiding students through reflective practice – The preceptors experiences. A qualitative descriptive study. *Nurse Education in Practice* 9: 66-175.
- Gibbs G (1988). *Learning by Doing. A guide to teaching and learning methods*. Oxford Brookes available from <https://thoughts-mostlyaboutlearning.files.wordpress.com/2015/12/learning-by-doing-graham-gibbs.pdf>
- May SA and Kinnison T (2015). Continuing professional development: learning that leads to change in individual and collective clinical practice *Veterinary Record* 177(13).
- O' Donovan M (2006). Reflecting during clinical placement – discovering factors that influence pre-registration psychiatric nursing students. *Nurse Education in Practice* 6: 134-140.
- Rolfie G et al (2001). *Critical reflection for Nursing and the Helping Professions – a user's guide*. Palgrave.
- Sandars J (2009). The use of reflection in medical education: AMEE Guide No. 44. *Medical Teacher*, 31(8): 685-695.
- Wallace S and May SA (2016). Assessing and enhancing quality through outcomes-based continuing professional development (CPD): a review of current practice. *Veterinary Record* 179: 515-520.
- General Medical Council, www.gmc-uk.org/doctors/revalidation/9612.asp
- Nursing Midwifery Council, <http://revalidation.nmc.org.uk>
- Royal College of Surgeons www.rcseng.ac.uk/standards-and-research/standards-and-guidance/revalidation



Alison Lambert
BVSc MMRS MRCVS

After qualifying as a veterinary surgeon from the University of Liverpool, Alison worked in small animal practice for several years before pursuing a business career. She worked with Hill's Pet Nutrition and MARS before founding Onswitch, www.onswitch.co.uk. Alison is a visiting lecturer at the University of Nottingham veterinary school, covering customer understanding.

So what's so special about millennials?

It feels to me as if marketers and social commentators have become a little too hung up about the 'millennial' generation – those young people reaching adulthood in the 2000s.

Understanding how these bright young things act and behave has become a huge focus for research agencies and business strategists; and it's probably fair to summarise that all this work seems to have proved is that they, like, use the internet on their smartphones – like, all the time.

Except I wouldn't mind guessing that you can identify with that – even if you're not in the typical millennial bracket. Because we all do more and more on our smartphones, use social media daily, and consult online reviews and comparison sites before buying goods and services, trying out a new restaurant or booking a holiday.

It is not new any more – it's just normal life. It is not millennial behaviour – it's my behaviour, and yours, and even old Mrs Smith's. Where do you think she's getting the cheap treats from that she insists on feeding her already obese cat?!

So I would like to suggest that we 'park' the millennial thing, and consider instead how to gain the best out of all the people who shape your practice – those who give you money and those to whom you pay money, your clients and your team.

Attracting and retaining great people, millennial or not

Countless articles have been written (some of them by me!) about how to attract clients. Over the years, I have come to realise that it is actually pretty easy to attract clients – one in two households owns a pet, so if you are near any kind of decently-sized housing estate,

a good number of pet owners are going to walk through your door – regardless of what you do. The challenge is getting them to come back.

Having said that, the single most important factor for owners choosing a practice is convenience – nationally 72.3 per cent of owners live within five miles of their practice (Onswitch, 2016). So, if you are local and you're not actively bad, many owners will use you anyway – except that the 'if you build it, they will come' approach doesn't build loyalty, drive repeat usage or create powerful brand advocates for your practice. In short, you are not going to get a thriving caseload from these guys just stopping by occasionally.

Successful practices understand their target audience and communicate their services and values with branding and messages that resonate with their needs. If your local catchment area contains mostly social housing, pushing a 'gold standard' health plan isn't going to work. Providing transparent and fair pricing and offering free preventive care nurse clinics will be far more appealing.

But you cannot build a brand on being cheap because it's very easy to copy and leaves you nowhere to go. You can build a strong brand on offering great value – not cheap, but ensuring excellent customer care and honest

recommendations in return for a fair and competitive price; because you appreciate the challenges facing your clients and understand they want the best for their animals.

The same goes for recruiting people – be true to who you are and advertise positions that reflect the unique nature of your practice. You don't just want someone to do the job, you need the right one, so you don't have to do it all over again in six month's time when they realise what you really mean by 'flexible rotas'. After all, recruiting is expensive and inefficient – and gaps in the team can quickly lead to motivation levels falling and others leaving.

Make sure that your practice ethos and values run through all your recruitment adverts, job descriptions and appraisal forms. Everyone on the team needs to feel ownership for driving the practice forward. Retaining great people is perhaps the biggest challenge facing practices today; yet it's made so much easier when you recruit people who fit.

Increasingly, young veterinary surgeons tell me that they look for social support networks when weighing up jobs – are there other veterinary professionals at a similar stage of their career? Will I have a mentor or coach I can talk to on site? Does the team socialise together? Is there a palpable sense of togetherness when I look round? Is the practice near people I know,

"...you cannot build a brand on being cheap because it's very easy to copy and leaves you nowhere to go"



*Suggested Personal & Professional Development (PPD)



MARKETING



or in a place I can make good friends? (We all need to off load after 'one of those days').

Attracting and retaining great people – whether clients or employees – requires focus and consistency. It requires you to be true to your practice values and to demonstrate these at every turn, in every communication and via every medium. And, honestly, it makes no difference whether those people are millennials or old timers.

Great communication is not about the medium

It's about the message and the memory. We all know that people are using smartphones more. Most received wisdom about marketing to millennials – although we don't believe in the concept of millennials now, remember! – decrees that it is all about digital content and social media campaigns. This seems to have led to many practices pushing everything onto SMS and e-mail; and whilst there is certainly a place for some client communications to be managed in this way – vaccine reminders, appointment

confirmations, and so on – these should not be at the expense of anything else.

How often do you get letters and cards these days? And how good do they make you feel on the rare occasion they arrive unexpectedly through the letter box? It takes time and effort to buy, write and post a card, and some things are well worth the effort. Sending a condolence card to a client whose beloved pet was put to sleep at the practice yesterday shows that you really care; writing it by hand and then getting the team members who were involved in the patient's care to add a message of their own or simply sign their name is even better. After all, we are all pet and horse owners ourselves – we understand how much it hurts to lose an animal.

Crucially, not only is this a lovely thing to do, it makes great business sense too, for two reasons:

- the recipient will tell family and friends about the lovely card she received from your wonderful practice. You cannot put a price on the value of heartfelt word-of-

"Make sure that your practice ethos and values run through all your recruitment adverts, job descriptions and appraisal forms"

mouth recommendation. It is probably the most effective way to recruit new clients

- the owner will be less likely to take her business elsewhere. Research consistently proves that as many as 20 per cent of clients leave their practice after having a pet euthanased, because it's either simply too painful to return or they were unhappy with the way the process was handled.

Of course, way back when, we would have dug out the parchment and wax seals and penned a consoling missive for despatch with the next rider. Centuries later we might have tied a note requesting help to the leg of a pigeon and hoped for the best. Not too many years ago we might have visited the Post Office and paid for a celebratory telegram. Now we reach for the phone and send a thumbs up emoji, or leave a message on a Facebook wall.

Times have changed, technology has moved on, and so must we – remember, it's not the medium that matters, it's the message you convey and the memories it creates for your client. Sometimes e-mails are fine, but there will always be times when only a telephone call really expresses the necessary emotions.

This is true for job advertisements too. Not so long ago, the only place to look for veterinary jobs was in the journals, and all the adverts looked the same and had the same cut-and-paste specifications about the role, without giving any feel for what the practice stood for and how the team worked. Now there are online recruitment sites, Apps, closed Facebook groups and the good old 'contact network'.

But whilst the media for recruiting new team members have become more numerous, I think this actually makes it harder for individual practices to stand out. Enlightened practices are doing creative stuff to cut through the 'guff' – a newly qualified veterinary surgeon doesn't really care how many theatres you have, she's more worried that she'll be left alone in them at 11pm on 'day one'. Talk about your values, what you do to support your people, how you have a rolling Friday cake rota – these are the things that engage with potential employees and set you apart as a practice that really cares.

I've worked with practices who have written poems to recruit customer care team members; who have designed adverts with striking visual elements to stand out on a page of black and white text; and all those stock photos of smiling blonde ladies with ponytails/dashing young men with designer stubble, wearing white coats.

It's not about the medium; it's about the message and the memory. Because we're *all* millennials now. ■

"It's not about the medium; it's about the message and the memory. Because we're all millennials now"

Reference

Onswitch aggregated Vox Pop data, January to December 2016

Practice Health Plans

Software designed
to **build your own**
health plans

Choose from a selection of standardised plans or create something bespoke to give your clients a more personalised service.



To find out more about Spectrum Practice Health Plan software
tel: **01359 243 400** or email: **enquiries@vetsystems.com**



AT VETERINARY SYSTEMS
www.vetsystems.com

Making the most of your practice KPIs – a new era

A successful business must have a thorough understanding of how well it is performing, so that it can build on its strengths and address any less successful areas. One of the best ways to measure how well a business is performing is to use key performance indicators (KPIs).

KPIs are measurable data, essential for good management. They reflect performance or trends occurring within a business that impact on the achievement of strategic goals and objectives. A well-managed veterinary business should monitor a range of KPIs in order to analyse and seek ways to improve service provision and profitability.

What KPIs the business uses will depend on the nature of the practice and the desired objectives of its owners.

"You cannot improve what you can't measure"

The first step in using KPIs to help manage the veterinary business is to identify the most important strategic goals and what the business hopes to achieve in the long term. Once these have been established, the KPIs can be measured.

Although every practice will have its own specific KPIs, there are a number of basic indicators that every practice should be monitoring.

Some essential practice KPIs

- active patients
- new patients
- number of appointments
- health plan subscription percentage
- average transaction value
- average consultation fee
- average surgical fee
- average client spend per annum
- average turnover per veterinary surgeon
- marketing campaign return on investment (ROI)
- percentage of vaccinated pets
- income from specific procedures (e.g. vaccinations, dentals, neutering, diagnostic procedures, lab tests).

The list of KPIs can become excessive, so it is important for managers to define precisely the information they require and choose factors to suit.

Most practices can now obtain standard KPI figures from practice management software. However, this can be time consuming – involving the generation of large reports – and for the busy practice manager there is always the temptation to place such activities at the bottom of their long 'to do' list.

Making dreams come true

In reality, most managers tend to look at six- or 12-monthly reports that show what has been happening in the practice. But looking retrospectively at practice statistics is not good enough if we want to respond rapidly to unforeseen changes and maintain a daily focus on achieving our strategic goals. Six months can be a long – and sometimes fatal – length of time in a poorly performing business.

What an improvement then it would be for the busy practice manager or owner to have this kind of information at their fingertips in real time, in an easily viewed format and to have the ability to act on today's figures – today.

To be able to see – at the press of a button or on a rolling dashboard – details of current active clients and animals, new patient registrations, sales over the last few days and current revenue statistics, current stock levels and fast-moving stock, e-mail/SMS campaign ROI and more, in all the practice branches, is a dream come true for many managers and owners.

And now this can all be achieved by using AT Veterinary Systems' new product, Ultralink.



Ultralink

Ultralink generates reports in real time. All information stored digitally can be extracted and processed continuously for live reporting. Results can be exported in standard reports or set up to feed live data into custom-built dashboards, where the results are displayed collectively in various formats. Dashboard results can be in the form of tables, charts, indicators, gauges and many other options – all of which can be viewed at a glance.

This enables managers to choose the KPIs relevant to their practice needs, create custom dashboards and then receive updated figures in a live data feed. Results can be refreshed within any scheduled time frame and automatically e-mailed to relevant parties.

You can set up separate dashboards to suit your practice requirements – for example, a consolidated set of KPIs with dashboards for each branch. Alternatively, groupings of KPIs (financial, appointment, patient demographics, and so on) can have separate dashboards for analysis of your business as a whole.

Integration with Spectrum DDS software enables reporting on areas such as sales, stock, appointments, microchipping, pet health parameters, reminders and insurance claims. Reports can be set to update when best suited to your practice with manual updates at the click of a button.

Ultralink comes pre-loaded with a range of common reports covering most aspects of your practice. These can be amended and customised, or new reports can be created using the in-built report editor – allowing you to report on any niche areas of your business.

Data from Ultralink reports can also be exported and saved for easy integration with Microsoft Excel or other programs.

Ultralink enables the practice to measure any of their chosen KPIs in real time so that problems in any particular area can be seen immediately – not months down the line – and successes can be identified and built upon without delay. ■

For a complete solution to managing KPIs, contact AT Veterinary Systems:

enquiries@vetsystems.com | 01359 243 400

Designed and
produced by  AT VETERINARY SYSTEMS
www.vetsystems.com



James Cronin
BSc PGDL LLM

After his first degree, James took a postgraduate Diploma in Law, followed by a Masters in Law at the University of Leicester. He has been advising veterinary practices on employment law and team performance since 1998 and has set up Eight Legal Ltd with his wife Kay, a veterinary surgeon.



Kay Hamblin
BVSc MRCVS

Kay graduated from Bristol Veterinary School in 1988 and gained wide experience in a variety of practices over a period of 25 years. She is now co-director of Eight Legal Ltd and is currently studying for a Masters in Business and Organisational Psychology with the University of Liverpool.



*Suggested Personal & Professional Development (PPD)



PERSONNEL

Dealing with employee sickness absence

There is little doubt that unexpected absence owing to sickness can cause major disruption in any business – and veterinary practices are no exception. Like many small businesses, there is rarely a 'spare' person able to step in, and the rest of the team inevitably have to shoulder the additional burden.

Recent estimates suggest that sickness absence costs the UK economy about £17 billion a year (one suggests up to £29 billion!) and that an average employee takes 6 to 6.9 days sickness absence per year, or 2.8 per cent of their contracted hours (CIPD & Personnel Today).

A certain level of sickness absence is inevitable, and the employee who valiantly 'struggles on' can be just as disruptive as one who takes a day off. But, what about those employees who just seem to be taking a bit too much time off, especially if you're worried it may be less than genuine?

Sometimes, simply letting the employee know that you're aware of the situation and are monitoring it, can be enough to deliver an improvement. The key thing, however, is to get a policy in place for managing absence – and to apply it consistently (**Figure 1**).

Absence management policy

It is beyond the scope of this article to detail an entire absence management policy, but your policy should include:

- procedure for notifying absence
- information about certification and 'fit notes'
- details of any company sick pay policy, and statutory sick pay
- what procedure you have for monitoring absence, including any formal 'trigger points'
- what will happen when an employee returns to work.

Monitoring absence

There are numerous methods recommended for monitoring

- Monitor absence rates and patterns (e.g. short-term intermittent, long-term)
- Have a clear policy
- Consider setting a target for reduction in absence rates
- Use return-to-work interviews and certification
- Early intervention can be beneficial to both parties (e.g. review meeting +/- medical report)
- Maintain regular contact during periods of absence
- Be flexible, where possible, with requests for time off
- Does the situation warrant disciplinary action or dismissal?
- Could this be a disability? If so, you may have to make a reasonable adjustment under the Equality Act 2010.

Figure 1. Key points to watch.

employee absence, with different 'trigger points' for taking action. In reality, whatever system you choose, it needs to be interpreted on a case-by-case basis, rather than rigidly applied.

Most systems monitor over a 12-month 'rolling' period, though you can choose to use a shorter period if you prefer.

Monitoring systems

The simplest methods of monitoring are to record total number of days of sickness absence and/or number of periods of absence. This allows comparison across the practice.

Consider calculating the percentage of normal working days/hours (the 'lost time rate'), because this accounts for part-time workers. Triggers could then be, for example:

- more than six days' absence in a 12-month period
- more than three periods of absence in a 12-month period
- more than three per cent 'contracted' hours lost to sickness.

You should also consider patterns of absence – for

example, frequently missing Mondays, Fridays or days adjacent to Bank Holidays.

1. The Lost Time Rate

This may be calculated for an individual employee, department or whole practice, allowing comparisons to be made and problem areas highlighted (**Figure 2**).

$$\frac{\text{Total absence (in hours or days)} \times 100}{\text{Total possible (hours or days)}} = \text{Lost time rate as a percentage}$$

2. The Bradford Factor

The Bradford Factor (B) is used to 'weight' multiple, short-term absences, which may be seen as more disruptive to the practice.

It is calculated by multiplying the total number of days of sickness (D) by the square of the number of separate occasions on which an employee has been absent owing to sickness (S).

$$B = S \times S \times D$$

For example, consider three employees who have each had six days of absence in the previous 12 months.



- Employee 1 has had one period of 6 days
Thus $B = 1 \times 1 \times 6 = 6$
- Employee 2 has had one period of 2 days, and one of 4 days
Thus $B = 2 \times 2 \times 6 = 24$
- Employee 3 has had 6 individual days
Thus $B = 6 \times 6 \times 6 = 216$

There are published tables of 'trigger points' for Bradford, which you might like to use at a return-to-work interview or annual review to highlight to an employee that their absence level is a concern. These tables are commonly used by large organisations, but we don't advocate following through automatically on the 'potential actions', which are listed in **Figure 3** as a guide only.

Certification & return to work

1. Fit Notes

A 'fit note' is required after seven days of sickness absence – including non-working days. If a 'fit note' says 'not fit for work', this is straightforward (usually!).

If it says 'may be fit for work', you should discuss with the

employee any changes that might facilitate a return to work. If you cannot agree on suitable adjustments, they should be treated as 'not fit for work'. Do not take the employee's word for it.

Just because they say they are fit to return, does not mean that their GP agrees – employees often say this and return early because they need the money. This could turn into a health and safety nightmare for you if something goes wrong later on.

The employee should keep the fit note, but do take a copy for your records.

"A certain level of sickness absence is inevitable, and the employee who valiantly 'struggles on' can be just as disruptive as one who takes a day off"

2. Self-certification

I recommend that anyone who has been absent for less than seven days because of sickness should complete a self-certification form upon their return.

3. Return-to-work interview

Consistent use of return-to-work interviews (RTWI) has been shown to reduce

absence. Try to conduct a RTWI after each absence, as soon as is practicable after the employee comes back to work.

As well as being a deterrent to abuse of sickness absence, the interview is an opportunity to discuss any issues that are impacting on the employee's ability to carry out their duties effectively.

$$\frac{\text{Total absence (in hours or days)} \times 100}{\text{Total possible (hours or days)}} = \text{Lost time rate as a percentage}$$

Figure 2. Calculating Lost Time Rate (%).

0-49	no action required
50-124	potential action – verbal warning
125-399	potential action – 1st written warning
400-649	potential action – final written warning
650+	potential action – termination of contract

Figure 3. Typical 'trigger points' and suggested action.

Remember the purposes of the RTWI are to:

- establish or confirm the reason for the absence
- welcome the employee back and check that they are well enough to return to work
- discuss the details of any agreed return-to-work plan – which should have been agreed in principle before the return to work
- update the employee about anything he or she may have missed whilst away
- consider whether they may have a disability under the Equality Act 2010
- establish whether their sickness is work-related, thereby to consider any health & safety issues arising.

Approaching the interview with an open mind and a friendly manner may encourage employees to reveal important sensitive details – such as whether they are being bullied at work or have issues because they are, for example, a carer outside of work.

Before the interview:

- review the employee's records, particularly absence
- consider the implications of any return-to-work plan
- plan your questions (open questions are best where possible) and try to establish how the employee feels
- consider your response if the employee requests a change of working pattern or phased return
- consider whether you feel a medical report is required – in general, I would recommend seeking medical advice sooner rather than later.

Based on your preparation and the interview, you may need to warn the employee about possible disciplinary action because of their absence record, or to discuss a target for improvement to prevent the need for disciplinary action.

Don't feel rushed into this at the time of the interview – if necessary, take time to consider; and arrange another meeting.

Company sick pay

Do you pay company sick pay in addition to statutory sick pay? Could this be encouraging some individuals to take more time off sick? There are plenty of reliable stories of employees calling up the practice manager to ask, "How many sick days do I have left this year?" – as if they see it as an extension to their annual leave entitlement! Consider making company sick pay discretionary, but *do not* attempt to change your employees' terms and conditions without seeking legal advice.

Disability

There is a common misconception that if someone has a disability, there is nothing you can do legally to manage their absence. This isn't true – you only have to make a reasonable adjustment. But absence owing to a potential disability does require very careful management, and you should always seek specific advice if disability might be a factor. You need to have a very good paper trail to show that you have taken all necessary steps.

And finally...

Remember, every case should be considered on its individual merits, especially if there is a possibility of disability being a factor in the reason for absence.

The information in this article has been produced as general guidance only, and is not a substitute for specific legal advice on any given situation. ■



"Just because they say they are fit to return, does not mean that the employee's GP agrees"

ultralinkTM

Discovering opportunities

Ultralink monitors all aspects of your practice's performance, generating live visual reports and revolutionising the way you view your practice.



Industry Profile



Your name: Cat Henstridge
BVS^c MRCVS
Position: General practitioner
Company: Peak Vets – an independent, small animal practice in Sheffield

What are your main veterinary interests and specialities?

I am a general practitioner and incredibly proud of that. First-opinion practice is the bedrock of our profession and I am pleased it is starting to be recognised as a speciality in itself.

My personal interests lie in geriatric medicine and client communication.

Being a working mum is always a balancing act. Does working in a veterinary practice make this easier or harder?

A bit of both I think!

In many ways, the veterinary profession is very conducive to part-time work. I have found employers are now pretty accepting of vets wanting to have reduced hours and, with a bit of flexibility on both sides, I have always been able to do days and hours to suit me and my family. It is also helpful that salaries for vets are a reasonable amount more than childcare costs, meaning it actually pays to go to work. The same cannot always be said for our RVN colleagues.

The hours that most practices are open can be difficult for parents, especially if they don't have home support. The vast majority of childcare providers shut at 6pm but, obviously, vets work later than this and part-timers are usually, understandably, expected to work their share of the late shifts. Out-of-hours and weekend work can present similar challenges and for some are a real barrier to returning to work.

This is a terrible shame and represents a loss both for individuals and the profession. However, I don't think there is an easy answer, and it is obviously down to individual clinics as to how they choose to work with professional colleagues with parental responsibilities; although those that manage to 'square the circle' will reap the reward in terms of both staff retention and satisfaction.

A high proportion of female vets work part-time for many different reasons. Do you think part-time work impacts the veterinary profession in a positive or negative way and do you think that being part-time enables you to really feel part of a working environment?

There is no getting away from the fact that being a part-timer brings its own particular challenges – for the vet, their practice and the profession. However, I definitely feel the positives outweigh the negatives!

I have found a common source of tension towards part-time vets in clinics comes if their colleagues are constantly having to

pick up cases or report results. Clients – and vets – much prefer continuity of care and so I think it is important to take on this responsibility and try to tie up loose ends before your days off. My practice also knows it can always contact me if it needs to – but it doesn't happen often!

Not being in every day can mean you feel out of the loop with the general 'goings-on' of the clinic – although I find a good gossip at tea break time soon helps me to catch up! My clinic also has a Facebook thread where we can chat about work, which also really helps me to stay connected. Again, the onus is on the part-timer to make sure they are part of the team – a good practice team, however, will always make you feel included.

Whatever the drawbacks, by facilitating part-time veterinary professionals, practices gain by retaining – or gaining – experienced, committed members of staff. The profession will suffer from less 'brain drain' and the vets themselves are able to maintain and expand their hard-won knowledge and skills.

What are your views on 'job share' as a means of filling full-time jobs?

I haven't ever been part of a 'job share' but I know they can work really well. I think they are most successful when, slightly ironically, the vets involved work as a team to ensure the hours are covered and clients and patients are taken care of. It can be a challenge initially to find two vets who are able to work opposite each other, but once a pattern is settled on and, as long as all parties have some flexibility, they can be incredibly successful.

We have moved from one imbalance to another in terms of male/female vets in the profession. Does this matter and should we be encouraging more boys to apply for veterinary school to try to redress or encourage a better balance in veterinary practice?

I think we need to move away from judging vets simply through the prism of their sex and start seeing everyone as an individual. Through all sections of society and the professions, gender roles are becoming less clichéd and the same is true of the veterinary world. More women are doing large animal work and taking on leadership roles, more men want to work part-time.



It sounds trite, but we should ensure all areas of veterinary work are accessible to all people; and if they are not, look at why they are not, rather than assuming it is simply a gender issue.

From the point of view of selecting students, the profession will benefit far more from encouraging a wide range of applications with respect to socio-economic and educational backgrounds, rather than worrying about whether they are boys or girls!

What would be your solution to reducing the stress many vets experience in veterinary practice?

How people experience and manage stress is hugely individual, so I think one key thing is making sure that we make it as easy as possible for vets to realise and admit they may have a problem – and then provide a range of tools for them to manage it. Creating a profession that is open about the mental challenges we face and ensuring there is no stigma in admitting you might be struggling and need help, is vital.

Also, a large part of the stress in practice comes from – in my opinion and experience – poor management and unreasonable client expectations. So practice leaders need to take responsibility for ensuring their staff have acceptable hours and levels of responsibility, and that clients know what they can – and cannot – expect from their service.

A significant proportion of graduates leave the profession or do not wish to enter general practice. There are many reasons for this, but do you think there needs to be a re-think about how we choose our veterinary students?

I think there is some argument to say that picking simply the most academically able at 18 years old is not ideal for this profession. However, universities have been aware of this for some time and make great efforts to select those who are academically, practically and emotionally intelligent.

I recently spent some time working at Nottingham University and was extremely impressed by their interview process; which involved both a traditional face-to-face discussion in addition to 'hands-on' sessions.

General practice isn't for everyone; but it is an excellent place to start and I do find that referral or industry vets who have spent time in first-opinion clinics before moving on, understand the challenges we face better than those who haven't. It also provides an extremely transferable skill set should you wish to leave the profession entirely – from time management to team work and much more besides!

With a new round of consultation of the profession on Schedule 3 and the role of veterinary nurses, do you think that RVNs should have more responsibility, and could this help to alleviate the current shortage of veterinary surgeons?

Veterinary nurses are not 'mini-vets'. I don't think they should be viewed as such and I don't think they want to be treated as such either. However, I think they are often under-utilised in practice and there is definitely scope to extend their remit.

When I graduated, RVNs were able to do much more surgically and I would like to see us go back to that – both from the perspective of their professional satisfaction and efficiencies in practice.



The onus is on practice principals and managers to look at how they deploy their RVNs to make sure they are working to their full capacity; and on the vet nurses themselves to speak up and push for more responsibilities.

With respect to a shortage of vets, thinking that staffing gaps can be plugged by nurses completely misses the point – as well as being wholly impractical. We should be looking at the bigger picture and thinking about why we are struggling to retain vets within the profession.

Why did you set up www.catthetvet.com and how do you see it being used and developed?

I wrote the bulk of the advice pages on www.catthetvet.com nearly 10 years ago now. I set it up because I felt there was a lack of sensible, practical owner-focused advice on the internet and I wanted somewhere I could send my clients to learn more about their pets' care and health. Now there are far more of these resources and so my focus on the site has shifted to my blog and social media presence.

How do you see the veterinary profession developing over the next 10-15 years?

I think we need to learn to work 'smarter not harder' in the coming decade. Pet ownership is in decline; but we shouldn't – and cannot – simply pump a smaller market for more money. We have to educate and engage with our client base – becoming more proactive in preventive medicine and more efficient at delivering health care.

I think the focus on work-life balance will continue to improve, which can only be a good thing.

The increasing corporate involvement in the profession isn't necessarily a negative; although we need to ensure that vets are present at all management levels to ensure the focus always remains on the animals – and that employees are able to maintain their professional integrity and provide a fair and great quality service.

What do you do in your spare time?

Mainly, write articles like this! I also have three small children who keep me busy; and I do enjoy a few episodes of 'Say Yes To The Dress'! ■

Stowe Veterinary Group

Veterinary Nurse Positions

We are an independent veterinary group based in Suffolk, with three veterinary centres and two branch surgeries. Our friendly & professional teams provide 24-hour veterinary care, on a first opinion and referral basis, to domestic pets, equine and farm animals.

Due to expansion, we require small animal veterinary nurses to work night shifts or a combination of both day and night shifts.

Our extensive facilities include a fully-equipped laboratory, hydrotherapy pool and treadmill, CT, digital x-ray, endoscopy, ultrasound and ECG as well as pet behaviour & training facilities.

These positions provide a great deal of flexibility and would suit recently qualified or experienced veterinary nurses with a passion and drive for delivering outstanding client and patient care.

We offer a good rate of pay, extensive CPD, staff discount and childcare voucher schemes and a happy, supportive working environment.

To apply:

Contact Jo Webster for an informal chat on 01449 613130 – or email recruit@stovevets.co.uk with your CV.



www.stovevets.co.uk

Veterinary Nursing Lecturer required in Kent

Central College of Animal Studies is looking to recruit an additional veterinary nursing lecturer for its Kent centre.

This position is a part-time role and would suit someone who wants to support, inspire and encourage those training to become veterinary nurses, while assisting in the development of the curriculum and course delivery.

The successful candidate will be a qualified veterinary nurse or veterinary surgeon, they will also be an excellent communicator with an approachable, confident and professional manner.

You will be joining a friendly and experienced team and will be fully supported in your professional development.

To apply, please email your CV and a covering letter to recruit@ccoas.org.uk



CENTRAL COLLEGE OF
ANIMAL STUDIES

www.ccoas.org.uk

Experienced Veterinary Nurse required in Bransgore, Dorset

Are you an experienced Veterinary Nurse looking to join a friendly, modern, independent veterinary practice?

Around 28-30 hours per week,
plus holiday cover for our other VN.
£10/hour.

Please send your CV to:
enquiries@bransgorevets.co.uk



www.bransgorevets.co.uk

Head Registered Veterinary Nurse Cat's Whiskers Veterinary Clinic Worthing, BN14

We are a small, independent, one-vet practice based in Worthing, West Sussex, specialising in feline only veterinary care, as we are a cat only clinic. We are actively seeking an experienced Head RVN to lead our small clinical team of RVNs and support staff, where we offer a personalised service taking time to get to know our clients and their cats.

We are offering the role as full-time or part-time. Full-time would be 4 days per week and part-time would be either 2 or 3 days per week. All shifts will be 08:00-18:30.

Job Type: Permanent
Salary: £26,500.00/year
Required experience: 2 years as a team leader

Additional benefits: Bonuses available. No weekends or out of hours. RCVS & BVNA subscriptions. CPD up to £500 p.a.

Please send your CV to: admin@cwvet.co.uk



Replacement full time veterinary surgeon required to join two senior colleagues in our Tier 2, Small Animal RVN Training Practice

Established 30 years and privately owned, we are looking for an enthusiastic, client-orientated team player. No OOH, and CPD encouraged.

Please email your CV to
David Frere-Cook MRCVS



at shieldvets@googlemail.com



The easy and efficient way to manage rotas

To find out more about Rota and Personnel Manager
tel: 01359 243 400 or email: enquiries@vetsystems.com



AT VETERINARY SYSTEMS
www.vetsystems.com



 **VETSTATION™**

Secure, powerful and versatile

To find out more about VetStation
tel: 01359 243 400 or email: enquiries@vetsystems.com



AT VETERINARY SYSTEMS
www.vetsystems.com