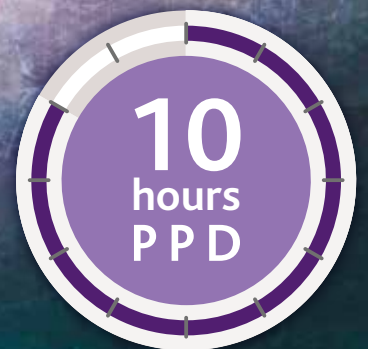


# Veterinary PracticeToday

THE JOURNAL FOR PERSONAL & PROFESSIONAL DEVELOPMENT

## Make the link and save a life

The link between  
animal and human abuse



**Blood-typing and cross matching**  
The changing face of transfusion medicine

**Neonatal kid care**  
Birth to four weeks

**Lizards**  
Common medical and surgical conditions

**Blind and partially sighted clients**  
What provisions do you make in your practice?

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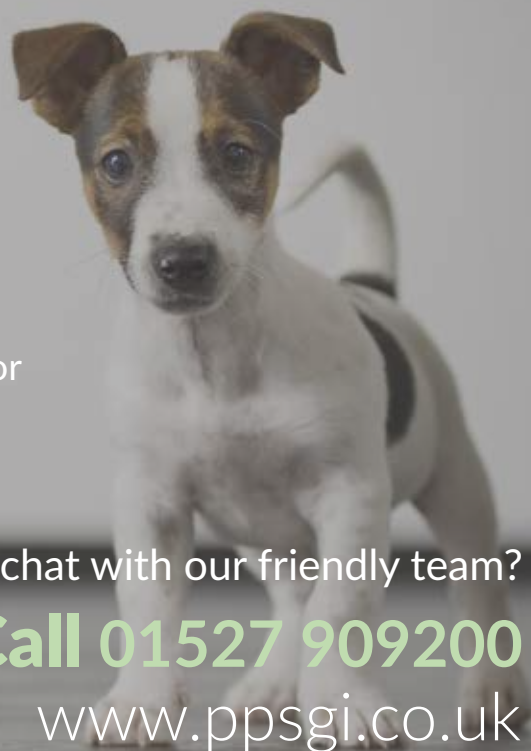


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# UP FRONT...

Our 'Comment' article in this issue has particular poignancy.

It is difficult for most of us to contemplate the dreadful way in which some of our fellow human beings treat both each other and, sometimes, their pets. If the veterinary profession can do anything at all to help prevent such abuse, then it must. It is true that most of us tend to shy away from 'getting involved', but there are some things that we cannot – and should not – ignore.

The veterinary profession is by nature a caring profession and this is often directly reflected in the welfare and husbandry articles we publish. In this issue we consider the welfare of newborn puppies, neonatal kids and exotic species of lizards. In all these cases it is not only the clinical aspects of care that we see, but also the animal husbandry and welfare that play such an important part in looking after these animals.

Husbandry and welfare set the standard. If we can get this right, we give the animals in our care a good start in life and, hopefully, make them better prepared for any other clinical issue that might befall them.

When we think about our profession, we naturally think of the care and protection of animals; but we should never forget the human element involved in our work. Care for our staff is an essential part of managing our practices – if we care for them they will, in turn, care for our clients and their pets. Client care is and always has been a really important aspect of managing a veterinary practice, but it is all too easy to lump all clients together assuming that one 'caring solution' fits every eventuality. This is eloquently disproved by our article on blind and partially sighted clients who have very special needs when they visit us.

It is likely that most practice managers have not thought very deeply about the partially sighted person's difficulties and have certainly not put themselves in this client's shoes. The article offers a practical guide on how to help the visually impaired client without causing embarrassment to either them or the staff members, and addresses such issues as waiting room layout, making payments and giving their pets medicines – things we, as sighted people, simply take for granted.

This is the final issue of *Veterinary Practice Today* for 2015 and David and I hope that you have enjoyed reading the articles and features that have appeared in the journal during the last 12 months – and maybe even gleaned ideas and perspectives that have changed the way that you go about your professional life. We are always interested in your comments and suggestions for topical and innovative subjects, so please do contact us via the email addresses shown in the adjacent panel.

We both wish you well for 2016 and hope to continue to provide you with interesting and stimulating reading.

**Maggie Shilcock**  
Editor

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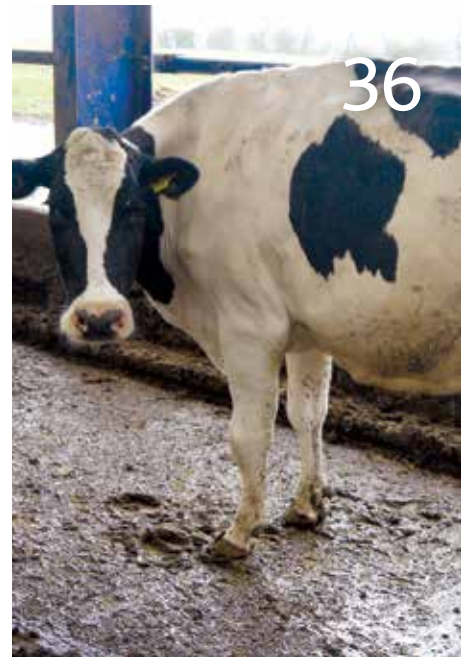


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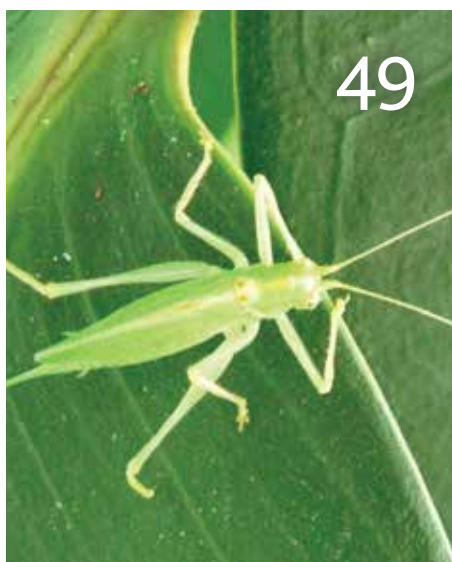
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Sean Wensley MRCVS, president of the British Veterinary Association.

## Featured contributors



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# Make the link and save a life



**Freda Scott-Park**  
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*Freda is a veterinary surgeon living and working in Scotland. She is currently chairman of the Links Group. During her time as president of the British Small Animal Veterinary Association and, following that, as president of the British Veterinary Association, she sought to ensure that veterinary surgeons were made aware of their role in recognising animal abuse; and beyond that, the possibility of associated violence to humans in a violent home.*

The Links Group came into existence 14 years ago, following a conference in November 2001 called 'Forging the Link' – and the natural question was 'link to what'? However, the conference clearly illustrated to 150 delegates the link between animal abuse, cruelty to children and domestic violence. The speakers, from both human and animal healthcare backgrounds, demonstrated that non-accidental injury in our pets or farm animals may be an indication that there is going to be – or already is – violence against a person (or persons) in the same household.



## Stunned into action

Immediately after the conference talks had been delivered, most veterinary delegates at the conference were looking stunned. Human healthcare colleagues were similarly shocked after the animal abuse presentations, although they were very familiar with the extent of child cruelty and domestic abuse that exists in violent households.

It was evident to those few vets present at the conference that members of the veterinary team needed to become better informed and a decision was made to form a multi-agency group with a common interest – to promote the safety and welfare of vulnerable children, animals and adults so that they are free from violence and abuse. Both vets and human healthcare professionals came together to better understand what could be done to intervene in the cycle of violence.

Progress in the veterinary world was slow at first and it was apparent that vets fell into three categories:

- those who didn't recognise – or claimed never to see – abuse
- those who recognised non-accidental injury (NAI) but chose to ignore it
- a growing cadre of people who recognised that they were seeing evidence of NAI and wanted to do something about it.

There were a number of barriers to progress – not least the understandable apprehension that by reporting incidences of non-accidental injury to the authorities there is a risk of driving animals away from treatment, just when they need it most.

Also there was overwhelming concern about breaching client confidentiality. The RCVS *Guide to Professional Conduct* (as it was then called) skimmed across these confidentiality issues with little useful direction for veterinary surgeons in practice. However, as awareness of abuse grew within the profession, veterinary surgeons and other members of the veterinary team had questions.

Veterinary professionals were looking for information and found that there was little that was easy to access. Calls to organisations such as the Veterinary Defence Society (VDS) increased, as veterinary surgeons faced challenging consultations where NAI was suspected. The Links Group recognised that there was a need for guidance for the veterinary profession in the form of a concise document answering questions about abuse and 'signposting' members of the veterinary team to where they could gain help.

## You are not alone

One of the difficulties lay in the section where practices need guidance on their approach to other agencies – either to report (if animal abuse is found) or to glean advice about violence to vulnerable humans. Clearly the main responsibility of the veterinary surgeon is to the animal under his or her care, and most practices have excellent relationships with the animal welfare agencies. The situation becomes more complex when a veterinary professional is faced with a human victim, or receives a disclosure of violence in a household.

## "The Links guidance document stresses that vets are not expected to become experts in abuse and are encouraged to seek advice if faced with a human victim"

In the first instance, the practice is directed to the professional conduct department of the RCVS – only an option in normal working hours, although the college is exploring the possibility of extending its hours of contact.

The RCVS works closely with the Links Group to ensure that the guidance in the *Code of Conduct for Veterinary Surgeons* chimes with the extensive veterinary guidance document produced by the Links Group, in liaison with the Animal Welfare Foundation (AWF) and Medics Against Violence (MAV). The RCVS is receiving an increasing number of advice calls.

On average, the standards and advice team handles one or two calls every day on the general subject of client confidentiality – which includes a wide mix of challenges; ranging from veterinary surgeons or veterinary nurses seeking advice on reporting potential animal welfare issues to how to handle requests for client information from the police to assist in the prevention, detection or prosecution of a crime.

Occasionally, the team receives calls relating to the links between animal, child and domestic abuse, specifically where a veterinary professional suspects that a child or adult within the home might be at risk. To assist, the RCVS has recently published updated guidance on dealing with child and domestic abuse (see [www.rcvs.org.uk/confidentiality](http://www.rcvs.org.uk/confidentiality)) and the team is happy to discuss cases in more detail before any potential breaches are made.

The Links guidance document stresses that vets are not expected to become experts in abuse and are encouraged to seek advice if faced with a human victim. Through a link with Medics Against Violence – a Scottish charity set up by mainstream healthcare workers – the technique known as A-V-D-R (ask, validate, document and report/refer) is now recognised as being an effective way to approach a difficult situation.

MAV has produced guidance on domestic violence for dental health professionals and has recently been awarded funding by the Scottish Government to roll out the AVDR training widely across health and social care in Scotland. This will utilise a 'train the trainers' approach and veterinary surgeons – along with other professionals – will be able to benefit from that funding by accessing free training in Scotland from early 2016.

The involvement of the veterinary professional when faced with a human victim is limited to offering a sympathetic ear and encouraging the victim to seek help. The Links Group has produced additional materials to offer the victim, including a contacts card specific to England, Wales and Scotland, giving them contact details of welfare agencies where they can seek help.

### The Force is with you

The Links guidance document also encourages the development of relationships at a local level with the police through a named contact – most police forces have dedicated teams that tackle

domestic abuse. They are aware of the links between domestic abuse and pet abuse, acknowledging the heightened risk for victims when their pets have been abused. They recognise that for many victims of domestic abuse, pets are a source of comfort providing strong emotional support for them and their children; however, perpetrators often exploit this bond and continue to do so when they move on to new partners.

The abuse of multiple pets may provide the police with an opportunity to link cases of domestic violence where perhaps evidence was previously lacking for court purposes as a single event, which explains their willingness to work with veterinary practices.

The Links Group now collaborates with Crimestoppers to provide another avenue of help for members of the veterinary team. Crimestoppers is an independent crime-fighting charity offering an anonymous and secure 24/7 service for third party information about domestic abuse or any other crimes, including animal abuse. Crimestoppers emphasises that they are not the police, nor are they a TV programme. Vet practices in Essex will soon know much more about the charity through a local initiative.

### Gaining momentum

Recognising that veterinary undergraduates received little training in how to recognise the signs of animal abuse, MSD Animal Health provide financial support for annual lectures to fourth or final year students in all but two of the veterinary schools. So most undergraduates now qualify as professionals with an enhanced perception of how to recognise the signs of abuse.

Helen Munro, together with Randal Munro, have continued to contribute to our knowledge base by publishing a textbook entitled *Animal Abuse and Unlawful Killing: Forensic Veterinary Pathology* (Munro R and Munro HMC, 2008) and the Links guidance is now readily available on the Links, RCVS, BVA, AWF and BSAVA websites.

With the support of the Margaret Giffen Charitable Trust, it has been possible to print the Links guidance and a short guide to recognising abuse in animals and humans for circulation to every home-practising veterinary surgeon on the RCVS register in Autumn 2015. Copies are available for all members of the veterinary team by contacting the Animal Welfare Foundation (AWF) at [www.bva-awf.org.uk](http://www.bva-awf.org.uk). ■

**\*Note. Freda Scott-Park's work for the Links Group is supported by the BVA.**

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Munro HMC and Thrusfield MV, 2001. *J Small Anim Pract* 42(5-8): 218-226; 279-290; 333-337; 385-389 respectively.

Munro R and Munro HMC, 2008. *Animal Abuse and Unlawful Killing: Forensic Veterinary Pathology*. Elsevier.

The Links Group website: [www.thelinksgroup.org.uk](http://www.thelinksgroup.org.uk)

The Links guidance document can be downloaded from [www.thelinksgroup.org.uk/site/pdf/Recognising\\_Abuse\\_FINAL\\_Sep\\_2013.pdf](http://www.thelinksgroup.org.uk/site/pdf/Recognising_Abuse_FINAL_Sep_2013.pdf)



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*Samantha has a website offering help and advice to breeders and to the veterinary profession, [www.puppyandkittenclinic.com](http://www.puppyandkittenclinic.com) and her book, Bloomfield's Manual of Puppy Hand Rearing, is available from the website and from [www.amazon.co.uk](http://www.amazon.co.uk)*



*\*Suggested Personal & Professional Development (PPD)*

## PUPPIES

# Nutrition of sick and immature newborn puppies

The feeding of sick and immature newborn puppies can provide veterinary professionals with a series of challenges. This article offers a practical, no-nonsense guide for the practice team and offers useful advice that can be passed on to dedicated and caring breeder clients.

Very immature, ill, dehydrated and hypothermic puppies cannot tolerate a milk replacer or colostrum, irrespective of whether it is artificial or from the bitch; and it is inadvisable to feed a milk replacer (or artificial colostrum) if a puppy's body temperature is less than 35.5°C because it will be unable to digest it properly, resulting in diarrhoea. These puppies need to be tube-fed an oral electrolyte solution for the first 12 to 24 hours.

Typically, these solutions are prepared by reconstituting a powder with 500ml of previously boiled, cooled water. When fed on its own, a proprietary oral electrolyte solution needs the addition of one level teaspoon of glucose powder into the 500ml of solution. Once cooled, this mixture can be kept in a sealed container in the refrigerator for 24 hours and the appropriate amount warmed for each feed – always mixing it well before use.

Puppies that start on an oral rehydration solution move on to milk replacer – reconstituted to half strength with the oral rehydration solution (without the added glucose) – once the urine is pale yellow and body temperature is normal. At this stage, the puppy may be strong enough to be fed by teat and syringe.

The next stage is to move on to half-strength milk replacer made up with water; before moving on to full-strength milk replacer.



*Puppies feeding.*

*Photo: Lynn Smith*

Healthy, mature puppies that need hand rearing or supplementation can be started directly on milk replacer formula fed from a teat and syringe.

There are numerous powdered and liquid milk replacer formulas available for puppies. Their composition is based on maternal milk, which may pose a problem for immature and ill puppies in that their nutritional requirements and ability to digest the food can be very different to that of 'normal' puppies.

The single, most common problem with hand rearing puppies is diarrhoea induced by the milk replacer. That aside, it is generally possible to use any reputable brand of commercially available puppy milk replacer with care as long as the puppy's body

temperature is normal, there is no diarrhoea and the puppy is mature.

Most milk replacers consist of a dry powder and most are reconstituted at one part powder to two or three parts water. For the first 48 hours, always use the milk replacer at half strength to allow the gut time to adjust. If the puppy does not develop diarrhoea, then the formula can be made up to full strength. If the motions are loose, then feed the diluted formula for another 24 hours before increasing the strength and volume fed at each feed.

### Preparing feeds

It is important to be hygienic when preparing the feeds and any unused food should be discarded after 24 hours. Prepared feed should be kept refrigerated and the amount required for each feed warmed





**Figure 1.** Essential equipment includes: milk replacer, measuring jug, screw-top plastic container to store milk replacer in refrigerator once reconstituted, two plastic containers with which to make a water bath to warm milk at each feed (or a baby's bottle warmer and small plastic container), a fine nylon tea strainer and a knife and teaspoon.

before use. Any left over should not be reheated but thrown away.

Equipment should be thoroughly cleaned in hot soapy water and rinsed with clean water (**Figure 1**).

Make up the feed with previously boiled water that has cooled to room temperature. Using water that is too hot can destroy some of the nutrients in the formula and also make mixing difficult. Scoops of powder should not be packed down but loosely filled, tapped down and then levelled off with a knife.

Mix well in a mixing jug and then strain three times using a fine nylon tea strainer, pushing

through any particles with a teaspoon. This is particularly important when tube feeding as small lumps can block a tube. Leave the milk lightly covered until cool; then once cool, keep in the refrigerator for no more than 24 hours in a sealed container.

Before each use, shake well and warm the required amount in a water bath to 37°C (body temperature). Either use a baby's bottle warmer or place the milk into a small plastic container floating in a larger container containing hot water from a kettle.

Test the temperature by dipping a clean finger into the milk – it should feel the same

temperature as your skin. A common cause of diarrhoea in hand-reared puppies is feeding milk that is too hot or too cold. Swirl the warmed feed around again before drawing up the appropriate volume into a syringe.

### Feed times

For a healthy mature newborn puppy, the following feed times can be used – 6.30am, 9am, 12 noon, 2.30pm, 5pm, 7.30pm, 11pm and 3am. Once the puppy is being fed full-strength milk replacer and is five to seven days old, the 3am feed is not necessary.

Ill and immature puppies, being fed the electrolyte solution, need feeding every one and a half hours until they move on to half-strength milk replacer reconstituted with oral electrolyte solution.

### Feed volumes

As a general rule, for each ounce (1oz = 28g) the puppy weighs, it should be able to consume about 1ml of milk at each feed. For example, a 5oz puppy (weighing approximately 142g) should be able to take 5ml at each feed.

To help avoid diarrhoea, always start by underfeeding by 1ml at each feed. This allows the gut time to adjust – for example, feed 4ml to a 5oz puppy at each feed. If the puppy's motions are

normal, then the volume fed at each feed can be increased gradually as shown in **Table 1**. If the puppies are still feeding from the bitch, then expect them to consume less.

As long as the puppy does not develop loose motions, increase the amount fed at each feed on a daily basis in line with its weight. A common cause of diarrhoea is overfeeding and so, if the motions become soft, go back a step in volume.

### Introducing solid food

When the puppy is three weeks old, it is possible to start introducing solid food. As with the milk replacer, this is introduced slowly – taking a step back for 24 hours if any problems arise.

It was once common practice to give puppies raw beef and cooked cereals at weaning and some breeders still advocate this. On nutritional – as well as food hygiene grounds – it is now recommended to introduce a good quality complete proprietary puppy food. Ideally, it is best to start with a canned formula.

Put the can in a refrigerator for a few hours to firm up before emptying out the whole contents and making a series of small 'meat balls' appropriate for the size of the puppy. These can be frozen in batches and defrosted in a refrigerator when needed. Meatballs can be kept in the refrigerator safely for a maximum of three days; but should be removed from the refrigerator half an hour before feeding to allow them to warm up to room temperature.

There are now suitable weaning 'mousses' too and special 'kibbles' designed to be soaked before feeding. These are also ideal for feeding to young puppies at this stage.

On day one, give one meatball at every other feed. Open the puppy's mouth and place it onto the tongue and the puppy will try to 'suck' down the meatball from your finger.

**Table 1.** Guidelines on the relationship between newborn puppy bodyweight and feeding volumes

| Weight of puppy in ounces (oz) | Approximate weight of puppy in grams (g) | Amount to be fed at each feed for at least the first 24 hours of artificial feeding (ml) | Amount to be fed at each feed for the next 24 hours as long as motions are normal (ml) |
|--------------------------------|--|--|--|
| 1                              | 28                                       | 0.5  | 1  |
| 2                              | 57                                       | 1  | 2  |
| 3                              | 85                                       | 2  | 3  |
| 4                              | 113                                      | 3  | 4  |
| 5                              | 142                                      | 4  | 5  |
| 10                             | 284                                      | 9  | 10   |
| 15                             | 425                                      | 14   | 15   |

If the motions are still normal on day two, give one meatball at every feed. Then, on a daily basis, increase the amount of solid food by one meatball at each feed in line with the puppy's appetite until it is able to eat from a shallow dish.

Offer the puppy milk replacer after each feed. In the beginning, the puppy will want the whole milk feed; but, as the amount of meatball is increased, the quantity of milk wanted may decrease. Around this time you may also try to introduce the puppy to lapping the milk replacer rather than taking it from a teat.

As long as the puppy is consuming an adequate amount of complete puppy food and lapping water, the milk replacer can be stopped at four weeks of age.

**Critical to the successful nutritional management of sick and immature newborn puppies, is their initial examination and assessment.**

As soon after birth as possible, each puppy should be identified, weighed and examined for abnormalities. Breeders should be encouraged to do this at home – and if the puppies are born at the veterinary practice, a written record of this information should be given to the breeder.

Puppies can be identified by coat markings and their sex; but if two puppies are similar, a small dab of different coloured nail polish to ears and tail tips is a useful method of identification. A clinical examination should include the rectal temperature, assessing heart rate, blood circulation, breathing, renal function and gut motility. And, above all, constant monitoring is vital.

Full details of the examination and assessment of newborn

puppies can be found in the March/April 2015 issue of **Veterinary Practice Today** [3(2): 14-16]

### Summary

The rearing of sick and immature newborn puppies can be an extremely rewarding aspect of veterinary care. However, it is vital not to underestimate the amount of time, attention to detail and committed TLC involved. ■

- never feed milk replacer to an immature newborn puppy or if the body temperature is less than 35.5°C, use electrolyte solution instead
- always start using milk replacer at half strength
- ensure the feed is at the correct temperature before feeding
- make any changes slowly
- always be on the lookout for any signs of diarrhoea
- if signs do appear, act immediately by going back a step and try again 24 hours later
- early weaning is extremely useful in those puppies whose guts struggle to cope with milk replacer formula and develop diarrhoea.



**vetcommunity.com**  
**Online edition**

### Further information

[www.puppyandkittenclinic.com](http://www.puppyandkittenclinic.com)

## PPD Questions

1. Which four groups of puppies should not be fed artificial colostrum or milk replacer?
2. What is the longest time reconstituted milk replacer can be stored safely in the refrigerator?
3. How many feeds should a healthy mature newborn puppy have in a 24-hour period?
4. What is the rough 'rule of thumb' for remembering how much milk replacer to give at each feed?
5. When can puppies start weaning?

**Answers**  
1. Puppies that are immature, ill, dehydrated or hypothermic  
2. 24 hours  
3. Eight feeds  
4. For every 10g bodyweight give 1ml of milk replacer  
5. Three weeks (sometimes earlier if necessary)

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\*Suggested Personal & Professional Development (PPD)

## RABBITS

# Rabbit anaesthesia – Part 2: some specifics

Part 1 in this series [VPT 3(4): 15-19] aimed to present an overview of rabbit anaesthesia to encourage the clinician to think about more than just drug doses. This article presents some anaesthetic options and other tips to consider for specific cases.

Good quality rabbit anaesthesia is very similar to anaesthesia of other companion animals. Care, preparation and attention to detail will always reduce risks and improve the quality of recovery of the patient (**Figure 1**).

One easy way of improving care and avoiding errors is to use a simple checklist. The author's is printed on a simple laminated A5 card and can be discussed briefly with the team before starting a procedure.

1. Is this the correct animal?
2. Is it the right sex? (useful for neutering procedures!)
3. Have the anaesthetic circuits, equipment and drug dose calculations been checked for faults/errors?
4. Is there any pre-existing disease – has this been allowed for?
5. Has the anaesthesia plan been discussed?
6. Has the analgesia plan been discussed?

### Monitoring

Capnography and pulse oximetry are valuable additions to standard observational monitoring techniques and should be included as standard monitors for rabbit anaesthesia owing to the frequency of pre-existing subclinical respiratory disease. Blood pressure monitoring is especially useful for sick patients.

### Analgesia plan

Non-steroidal anti-inflammatory drugs (NSAIDs) are useful in this respect and meloxicam is well tolerated by rabbits –

the oral form is highly palatable postoperatively.

Opiates are widely used in rabbits and provide both sedation and analgesia. In the author's experience, the view that opiates cause ileus is incorrect as long as appropriate doses are used. The majority of ileus cases after surgery will be related to pain – optimal pain management is essential and opiates are an important component of this.

Lidocaine can be used for simple pedicle blocks and splash blocks during surgery (see Part 1), but take care to stay within a safe total dose. Metoclopramide has been shown to have analgesic properties in humans (Derbent et al, 2005) and in rabbits (Cai et al, 1994), probably via activity at dopamine receptors, in addition to prokinetic properties. This agent may have value in potentiating other analgesic agents.

It is the author's opinion that a combination of good preoperative husbandry, stress reduction and careful analgesia is more likely to prevent ileus than the routine use of pre-operative prokinetics in healthy patients. However, pre-operative use of prokinetics for sick rabbits or rabbits on a low fibre – or otherwise imperfect – diet, is definitely justifiable.

'Distraction analgesia' (diverting attention away from a painful stimulus) is probably best achieved by providing access to a bonded

**Figure 1.** Overview of concepts to consider for each patient.

- correct any husbandry problems wherever possible (see previous articles for more detail)
- rabbits are a prey species and are easily stressed. Reduce stress by housing away from predator species, use gentle handling techniques and ideally house with a bonded partner rabbit. If a separate area is not available, a puppy crate in a quiet room is a good alternative
- consider drug options carefully for each patient, to include analgesia, induction and maintenance agents, plus or minus prokinetics agents
- ventilate during anaesthesia, using a small tightly fitted face mask, a v-gel supraglottic device or a new uncuffed Portex endotracheal tube (see Part 1 article). Use electronic monitors wherever possible as these will allow earlier identification of problems.

partner rabbit before and after anaesthesia.

### Other considerations

Ear vein catheter placement for emergency intravenous access is always a sensible precaution, even if intravenous fluids are not administered; while

**Table 1.** Anaesthetic agents that may be used in rabbits\*

| Agent               | Suggested dose rate  | Reference   |
|---------------------|--|---|
| Fentanyl/fluanisone | 0.1ml/kg IM followed by propofol slow IV (mean dose 2.2mg/kg) to effect  | Martinez et al (2009)   |
| Medetomidine        | 0.2-0.25mg/kg IM or SC<br>0.08-0.1mg/kg IM or SC<br><br>0.2mg/kg SC  | Hedenqvist et al (2001)<br>BSAVA <i>Manual of Rabbit Surgery, Dentistry and Imaging</i><br>Author's experience  |
| Atipamezole         | 1mg/kg   | Orr et al (2005)  |
| Butorphanol         | 0.3mg/kg<br>0.2mg/kg   | Schroeder and Smith (2011)<br>Author's experience   |
| Buprenorphine       | 0.03mg/kg<br>0.01-0.15mg/kg IM, SC, IV<br><br>0.03-0.05mg/kg IM, SC  | Schroeder and Smith (2011)<br>BSAVA <i>Manual of Rabbit Surgery, Dentistry and Imaging</i><br>Author's first choice for postoperative and ileus – related analgesia |
| Ketamine            | 10mg/kg<br>15mg/kg   | Author's experience<br>Orr et al (2005)   |
| Midazolam           | 2mg/kg IM<br>0.4mg/kg IV combined and administered simultaneously with ketamine 5-10mg/kg IV given to effect. Produces short-acting, moderately profound, sedation which can be extended using isoflurane or sevoflurane | Schroeder and Smith (2011)<br>Author's experience   |
| Propofol            | 10mg/kg IV (should be administered slowly and to effect – author's opinion is that 2-6mg/kg IV is more appropriate in a premedicated rabbit)<br>Mean dose to effect, 2.2mg/kg IV   | Gil et al (2012)<br><br>Martinez et al (2009)   |
| Alfaxalone          | 4mg/kg IM<br>3mg/kg IV given slowly to effect  | Huynh et al (2014)<br>Gil et al (2012)  |
| Lignocaine          | <2mg/kg total dose – duration appears to be 0.5-1.5 hours in clinical use  | Author's experience   |
| Meloxicam           | 0.1mg/kg PO bid (meloxicam clearance is very rapid in rabbits (Turner et al (2006))<br>0.3-0.6mg/kg SC, PO sid   | Author's experience<br><br>BSAVA <i>Formulary</i>   |
| Metoclopramide      | 0.5-1mg/kg SC, PO, bid-tid<br>Prokinetic and may potentiate other analgesic agents   | BSAVA <i>Formulary</i>  |
| Ranitidine          | 4-6mg/kg PO, SC sid-tid  | BSAVA <i>Formulary</i>  |

\*Note. Few agents are licensed specifically for use in rabbits, so these doses should be interpreted with care, especially in sick rabbits. Rabbit anaesthesia is evolving rapidly and it is sensible to check dose rates from several up-to-date sources before trying new combinations.

intra-abdominal fluids are useful during long abdominal procedures and before abdominal closure in order to prevent serosal trauma.

If any fluids are used they should be appropriately warmed, because it is always easier to keep a patient warm, rather than to warm a cold patient. Hypothermia

must be expected with such a small animal during an abdominal procedure, so rectal temperatures should be monitored routinely and steps taken to prevent and correct even minor hypothermia.

Rabbits are prone to hypoxia and should be ventilated with oxygen while sedated or anaesthetised (**Figure 2**).



**Figure 2.** A lightly sedated rabbit being ventilated with oxygen. Note the small-volume face mask, positioned so that the nostrils are wide open. Sternal recumbency minimises lung compression.

## Case histories

## EXAMPLE 1

**A six-month-old female rabbit for spay** – normal clinical examination; no husbandry issues; no evidence of disease.

Consider the following protocols:

#### Medetomidine, butorphanol, ketamine combination

Medetomidine (or dexmedetomidine) combinations are widely used in UK rabbit practice. This combination will result in a light to a moderate plane of anaesthesia that may require further drug administration (normally volatile agent) to achieve an adequate plane of anaesthesia for intubation or surgery. It is notable for the rapid recovery after administration of the reversal agent.

Subcutaneous administration is less painful than intramuscular administration, and is still effective. When given subcutaneously, the full effect should be achieved within five to 15 minutes. The  $\alpha$ -2-agonist component of the combination can be reversed by administering atipamazole. The author's preferred dose rates and some alternative dose rates are shown in **Table 1**.

#### Fentanyl:fluanisone combination

Fentanyl:fluanisone (Hypnorm, Vetapharma) is administered by the intramuscular route, followed by propofol given intravenously to effect. This combination will provide surgical anaesthesia, good analgesia and good muscle relaxation. However, the author's experience is

that recovery can be slower than the medetomidine combination, which can present problems in the general practice environment where it is preferable to send patients home on the day of surgery.

Propofol can be replaced by ventilation with isoflurane or sevoflurane via a small, tightly fitting face mask if the rabbit is sufficiently sedated (**Figure 1**). It is vital that the rabbit has reached a sufficient plane of anaesthesia to prevent any reaction (gagging, coughing or moving) when an endotracheal tube or v-gel airway device is placed.

## EXAMPLE 2

**A sick rabbit** – anorexic, recent weight loss; bloods show raised liver enzymes; stomach feels hard when palpated. Gastric impaction is suspected, and an exploratory laparotomy is planned.

This patient might benefit from a delay before commencing anaesthesia in order to correct dehydration and electrolyte imbalance. Syringe feeding and prokinetic drug administration may be beneficial, depending on the degree of gastric impaction. The degree of delay depends on the severity of clinical signs. Rabbits with a suspected intestinal obstruction require rapid stabilisation and early surgery.

Remember that  $\alpha$ -2-agonist drugs cause significant cardiovascular changes and are not the best choice for sick patients. It is wise to gain experience with other drug combinations in elective procedures, so that the clinical team can use alternative drugs safely.

In a sick patient, other combinations are worth considering (**Table 1**) – both propofol and alfaxalone inductions will be improved when premedication agents are used:

- buprenorphine alone (mild sedation and analgesia), followed by an intravenous induction agent
- ketamine, combined with midazolam, administered intravenously. This combination produces profound sedation, although muscle relaxation is poor using the author's dose rates described in **Table 1**. Onset of sedation is rapid and will last approximately three to five minutes. This allows sufficient time to 'top up' with a volatile agent by face mask ventilation, or propofol or alfaxalone can be administered by slow intravenous injection to effect
- propofol may be used, although apnoea can occur after rapid administration, as seen in other companion mammals; and the author has experienced problems achieving sufficient anaesthetic depth to intubate safely
- alfaxalone is a useful intravenous agent, but apnoea can occur after rapid infusion. The author's experience with this agent is that

it results in a more controllable induction than propofol.

Intramuscular dose rates exist, but intravenous induction is more controllable and appropriate for a sick rabbit

- mask inductions are very stressful and might increase anaesthetic risk. It is generally preferable to sedate the patient before administering volatile agents via a small, well-sealed face mask. The patient should be ventilated to ensure adequate oxygenation and agent uptake.

Hypothermia is likely during prolonged abdominal surgery, so body temperature should be monitored frequently. Intravenous and abdominal flush fluids should be warmed, and the ears and feet can be wrapped in reflective and insulating layers to reduce heat loss.

The use of a capnograph and pulse oximeter should be mandatory in these patients. Other equipment, such as a blood pressure monitor, can be very useful to allow early intervention during anaesthesia. It is much better to prevent an emergency rather than try to treat one!



**EXAMPLE 3****A rabbit requiring sedation for radiography.**

Gentle restraint or light sedation is often all that is needed for abdominal radiography. Dental radiography, however, always requires sedation for accurate positioning.

Consider the following options:

**Medetomidine combinations**

(see EXAMPLE 1). This would be an appropriate protocol for a relatively healthy patient

**Midazolam + ketamine intravenous combination**

This should be considered for a sick, anorexic or dehydrated rabbit patient

**Buprenorphine (SC, IM or IV)**

This results in mild sedation that is useful to assist handling and positioning, but might be insufficient for dental radiography.

**Conclusion**

The advantages and disadvantages of certain agents – or combinations – in rabbits share many similarities with normal dog and cat anaesthesia. If drug combinations are chosen that are tailored for the needs of each individual patient, this will help to reduce both pain and the risk involved with anaesthesia. ■

**EXAMPLE 4**

Many procedures in rabbits do not require sedation or general anaesthesia and can be performed *under local anaesthesia*. An analgesia plan should still be made and would normally include an NSAID +/- an opiate. These procedures might include:

- tear duct flushing (use sterile, single-use ocular preparations of local anaesthetic agent)
- wound management or removal of small skin masses
- 'marsupialisation' of small abscesses, such as ear-base or bite-wound abscesses.

**Procedure for ring block of a small structure**

This would be appropriate for an ear-base abscess. The surgical area should be clipped and cleaned, and topical lidocaine (EMLA cream, AstraZeneca, UK) should be applied over the area using a gloved finger. Onset of analgesia varies – depending on skin thickness – but should be induced within 10-30 minutes.

A series of small-volume lidocaine injections can then be placed in a ring around the structure to be desensitised (**Figure 3**). Further lidocaine

injections may be necessary for deeper tissue, and the skin should be prepared for surgery after the block is placed.

The patient should be towel-wrapped and gently restrained for the procedure. The eyes should be lubricated for protection – covering the head can help restraint but ensure that airflow to the nostrils is not impeded. The surgical environment needs to be kept calm and quiet for this technique to be successful. Placement of an intravenous ear vein catheter allows rapid administration of sedation should the patient start to panic (although this has never been an issue in the author's practice).



**Figure 3.** A lidocaine ring block being applied around an ear-base abscess prior to marsupialisation.

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## PPD Questions

Which of the anaesthetic plans\* below would be the most appropriate for:

1. Routine castration of a 6-month-old rabbit with no abnormalities on clinical examination and no husbandry problems identified
2. Dental radiographs in a 1-year-old, stressed, Netherland Dwarf rabbit, to assess dental disease. No clinical problems have been identified apart from maloccluded incisors, plus a reduction in hay intake and a small reduction in dropping size. Intra-oral examination was impossible during the initial consultation and needs to be performed during the same procedure
3. Elective exploratory laparotomy to investigate persistent abdominal pain in a 7-year-old rabbit. Routine haematology, biochemistry and abdominal radiography were unremarkable. Rabbit is drinking and urinating but not eating well, droppings are small and rarely passed
4. Removal of a 1cm pedunculated soft tissue mass on the lateral flank of a 9-year-old rabbit with a long history of recurrent upper respiratory infections
5. Abdominal radiography required for a 4-year-old un-neutered female lop-eared rabbit to evaluate a suspected uterine mass. Surgery not planned for today. The rabbit is relatively easy to handle but will not lie in lateral recumbency.

Possible anaesthetic plans\*

\*Note. Each option can be used once only.

- A. Medetomidine 0.2mg/kg SC, butorphanol 0.2mg/kg SC, ketamine 10mg/kg SC, meloxicam 0.2mg/kg SC, lidocaine splash block, total dose <2mg/kg. Ventilation as appropriate via face mask or v-gel supraglottic airway device, on oxygen and isoflurane during procedure. Atipamezole reversal 1mg/kg IM.
- B. 1-2 days preoperatively – start IV or SC electrolyte fluids, ranitidine 5mg/kg PO tid, syringe feeding in order to improve gut motility. Preoperative administration of ranitidine SC. 5mg/kg plus syringe feeding >30 minutes before induction of anaesthesia, followed by mouth flush to ensure mouth is clear before induction. Premedication buprenorphine 0.08mg/kg IV, induction alfaxalone 3mg/kg IV, maintenance sevoflurane + oxygen, ventilator/IPPV. Splash blocks lidocaine, total dose <2mg/kg.
- C. Preoperative administration of ranitidine SC 5mg/kg, plus syringe feeding >30 minutes before induction of anaesthesia, followed by mouth flush to ensure mouth is clear before induction. Medetomidine 0.2mg/kg SC, butorphanol 0.2mg/kg SC, ketamine 10mg/kg SC, meloxicam 0.2mg/kg SC. Ventilation as appropriate, on oxygen and isoflurane during procedure. Atipamezole reversal 1mg/kg IM
- D. Local anaesthetic – EMLA cream plus lidocaine ring block +/- meloxicam 0.2mg/kg SC.
- E. IV buprenorphine 0.05-0.1mg/kg

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



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## Blood typing and cross-matching

The emergence of blood banks – over eight years ago in the UK – has led to the availability of blood components (products); packed red blood cells; fresh frozen plasma; frozen plasma; cryo-precipitate and cryo-supernatant. These blood components have changed the face of transfusion medicine, and are being used to treat a wide range of conditions – not just for 'life-or-death' situations. This, in turn, has led to a positive outcome for thousands of patients whose previous treatment options were limited. To date, only canine blood products are available, with feline transfusion patients being restricted to fresh whole blood donated by emergency donors at the time.

With more and more veterinary professionals practising advanced transfusion medicine, a greater understanding of using blood products becomes increasingly important. Not only to ensure best practice, but also to make best use of the blood donated by dogs whose owners kindly bring them along to donation sessions across the UK.

### Blood typing background

As is the case with humans, dogs and cats have blood types. These are species specific.

### Dogs

The different canine blood types are described as dog erythrocyte antigens (DEA). In simple terms, these are markers on the surface of

the red cells. There are eight DEA antigen systems 1.0, 3, 4, 5, 6, 7, 8 and Dal that have been determined through studies to have the potential to cause acute or delayed immunological transfusion reactions (**Table 1**). There may be many more that have not been defined.

Dog blood group systems are inherited independently which permits them to coexist on the surface of the red cell allowing dogs to have more than one blood type.

Dogs in the UK are currently either described as DEA 1.1 positive where there is 1.1 antigen on the surface of the red cells, or DEA 1.1 negative where there is no 1.1 antigen present on the surface of the

red cells – this blood type is the most significant clinically when considering transfusion, owing to its potential to cause fatal acute haemolytic reactions in previously sensitised dogs.

Recently, however, Acierno et al (2014) concluded the DEA 1.0 system – that was previously thought to have up to three blood types within its system (1.1, 1.2 and 1.3) – does not exist and that only a DEA 1 antigen is present, graded from weak 1+ to strong 4+. These findings are similar to those of the author's experience – Pet Blood Bank UK hopes to publish data in 2016 on its donor population with regard to donor blood type including its DEA 1 weak status.

**Table 1.** Canine blood group systems showing their antigen phenotypes and prevalence in the population\* (Null phenotype means the dog does not carry genes for the expression of the antigen)

| Canine blood group system | Antigen phenotypes  | Population prevalence | Incidence of naturally occurring antibody | Comments  |
|---------------------------|---------------------|-----------------------|---|---|
| 1.0                       | 1.1, 1.2, 1.3, null | 62%, 2%, 0.1%         | < 2%                                      | Commercial typing system available for 1.1 only |
| 3                         | 3, null             | 5%                    | 8-15%                                     |   |
| 4                         | 4, null             | 98%                   | Rare                                      |   |
| 5                         | 5, null             | 15%                   | 8-12%                                     |   |
| 6                         | 6, null             | 96%                   | Unknown                                   | No available typing system                      |
| 7                         | 7, null             | 40-55%                | 10-40%                                    |   |
| 8                         | 8, null             | 20-40%                | Unknown                                   | No available typing system                      |
| Dal                       | Dal, null           | 99%                   | Rare                                      | No commercial typing system                     |

\* Reproduced from Hale A (2012) Canine blood groups and blood typing, *BSAVA Manual of Canine and Feline Haematology and Transfusion Medicine*, 2nd edition, eds M Day and B Kohn, with the permission of the publisher.



\*Suggested Personal & Professional Development (PPD)



**Table 2.** Estimated frequency of type B cats in various breeds. (For some breeds only small numbers of cats have been tested, so the figures may not be as accurate as they would be if results were available for larger numbers of cats. The proportion of group B cats within a breed may change with time, depending on breeding choices and patterns within that breed)

| Only type A         | Low type B frequency (1-10%) | Intermediate type B frequency (10-25%) | High type B frequency (>25%) |
|---------------------|------------------------------|--|------------------------------|
| Siamese*            | American shorthair*          | Abyssinian*                            | British shorthair* ^         |
| Tonkinese*          | Maine coon*                  | Birman* ^ †                            | Cornish rex*                 |
| Oriental shorthair* | Manx*                        | Burmese^                               | Devon rex* †                 |
|                     | Norwegian forest*            | Himalayan*                             | Exotic*                      |
|                     | Bengal**                     | Persian* ^                             | Ragdoll*                     |
|                     |                              | Scottish fold*                         | Turkish van*                 |
|                     |                              | Somali*                                | Turkish angora*              |
|                     |                              | Sphynx* †                              |                              |

\* Figures supplied by Dr Giger, University of Pennsylvania

^ Figures from a study of UK cats conducted by C Knottenbelt, University of Glasgow

† Figures supplied by Dr Addie, University of Glasgow

\*\* Figures supplied by Professor D Gunn-Moore, Edinburgh University

**Table 3.** Canine blood type compatibility showing the red blood cell product that should be used when performing a red blood cell transfusion

| Donor blood type | Patient blood type         |   |
|------------------|----------------------------|---|
|                  | DEA 1.1 Negative           | DEA 1.1 Positive                                    |
| DEA 1.1 Negative | Yes                        | Emergency only – will deplete valuable stock levels |
| DEA 1.1 Positive | No; will sensitise patient | Yes   |

The author will continue to refer to DEA 1.1 for the purpose of this article as this is currently the blood type indicated on blood product labels in the UK; although product labelling may change to DEA 1 in time when more information is known.

There are several commercial typing test kits available to veterinary practices for 'in-house' use. These are listed at the end of this article – one of the most common being described in detail in the step-by-step guide – and it is worth noting that this company now labels its canine typing kit as an indicator of DEA 1.

With regards to the other blood group systems, identification of these is limited to individual laboratories that are distributed globally, mainly in the USA. Extended typing

is of use when dealing with complex multiple transfusion patients and transplant patients.

Most of the research into canine blood types that we use today was performed in 1949 (Young et al, 1949). The science of companion animal immunohaematology will continue to develop as there are many unanswered questions making transfusion medicine an ever-evolving field in the veterinary profession.

### Cats

Feline blood groups are inherited. Our understanding is that cats have a relatively simple blood group system. Feline blood groups are described as A, B or AB blood type. There are three alleles that control the AB blood type.

The A allele is dominant over the B allele and the phenotype AB is the result of the third allele (aab) – this allows co-dominance expression of both A and B. Cat breeders are likely to ask for their breeding cats to be blood typed owing to its importance in reducing neonatal isoerythrolysis in their kittens.

The prevalence of blood types varies with breed and also by country, so refer to **Table 2** (supplied by International Cat Care for type B breeds) and [www.icatcare.org](http://www.icatcare.org) for more information.

### Compatibility

Identifying blood type antigens is one part of compatibility; the other is ensuring any blood given is not going to be removed from the patient's circulatory system prematurely. Alloantibodies are antibodies

that are made against antigens occurring naturally within the same species. Alloantibodies attach to antigens on red cells and may initiate a process that causes destruction or removal of any transfused red cells containing that antigen. Alloantibodies can be naturally occurring or occur through previous sensitising to a foreign antigen.

### Dogs

Dogs rarely have any naturally occurring alloantibodies in their circulation (**Table 1**). Sensitisation from a previous transfusion with incompatible blood is the main cause of alloantibodies.

On first transfusion, DEA 1.1 positive blood should only be administered to a DEA 1.1 positive patient to prevent sensitising the DEA 1.1 negative patient to the foreign 1.1 antigen and thus

creating the potential for production of alloantibodies. Subsequent administration of DEA 1.1 positive blood to a sensitised DEA 1.1 negative patient can produce an acute immune-mediated transfusion reaction which is potentially life-threatening and must be avoided by ensuring the correct blood type is administered.

DEA 1.1 negative blood should be administered to DEA 1.1 negative patients. Although no adverse effects occur when administering DEA 1.1 negative blood to a DEA 1.1 positive patient, DEA 1.1 negative donors make up just over 30 per cent of the dog population presented as donors. Using DEA 1.1 negative blood on DEA 1.1 positive patients has ethical and welfare implications, most importantly it means stocks of DEA 1.1 negative blood could subsequently be depleted to a level that makes it unavailable to DEA 1.1 negative patients (**Table 3**).

### Cats

Unlike dogs, A and B cats develop alloantibodies naturally to other blood groups within the first few months of life (AB cats do not). This means cats are at great risk of transfusion reaction if blood typing is not performed prior to initial transfusion to allow the correct blood type to be administered. Basic compatibility in cats is illustrated in **Table 4**.

Type A cats generally have low levels of anti-B alloantibodies in their serum, whereas type B cats usually have high levels of anti-A alloantibodies in

their serum making typing prior to transfusion extremely important. AB type cats have no alloantibodies to either A or B, however, so donors are hard to find.

Bearing in mind the low level of anti-B alloantibodies in serum, if a search for a rare AB type matched donor is unsuccessful, it is recommended to use a type A donor for transfusion, although some reaction will be seen. Type A packed red cells or washed type A red blood cells would be even better – but these are not usually available or producible in general veterinary practice.

### Cross-matching Dogs

As discussed in the introductory typing section, dogs have many blood types that coexist on the surface of their red cells and with the absence of in-house testing kits for all of these blood types, DEA 1.1 (DEA 1) is the only status a general practitioner can detect quickly and easily. It must be assumed that even when DEA 1.1 typed blood is given correctly to patients, there is still the potential to introduce other antigens which may be 'seen' as foreign and that, in turn, the patient may create antibodies against them. It is, therefore, recommended to perform a cross-match prior to transfusion in dogs if:

- the transfusion history of the dog is unknown
- previous transfusions have caused a reaction
- a transfusion has been administered 4-7 days (or more) previously.

Performing a cross-match for dogs with immune-mediated haemolytic anaemia can be challenging owing to background agglutination and haemolysis. It is recommended to transfuse the patient with red cells that are the 'most' cross-match compatible in these circumstances.

### Cats

Cats are likely to have additional blood types recognised as transfusion medicine advances. For example, in 2007 the Mik antigen was discovered (Weinstein et al, 2007) and no in-house testing kits are available to date. For these potential rare instances, cross-matching cats prior to any transfusion is recommended.

### Cross-matching techniques

Cross-matching is an *in vitro* test that looks for potential reactions between a donor's and a patient's blood. These show as agglutination or haemolysis. Agglutination is the more commonly seen in canine incompatibilities – haemolysis is less common. In cats, both agglutination and haemolysis can be seen.

The cross-match test required depends on the type of product being transfused – major cross-match for red cell products and minor cross-match for plasma products:

- major cross-match assesses the compatibility between donor red blood cells and patient plasma/serum
- minor cross-match assesses the compatibility between donor plasma/serum and patient red blood cells.

Anticoagulated whole blood contains both red blood cells and plasma; so performing both a major and minor cross-match is recommended when administering whole blood.

Cross-matching can be performed in a laboratory with minimal equipment and takes up to 60 minutes; or in-house kits are simple to use and provide a quicker solution, taking 15 to 20 minutes to perform. The use of one of these kits is described as a step-by-step guide in this article.

Alternatively blood from both donor and patient can be submitted to many commercial laboratories for cross-matching; although this can take up to 24 to 48 hours before results are available.

### Currently available 'in-house' tests

Alvedia Feline and Canine Quick Typing Tests (single units or 20 multi-pack lab test) work in the presence of agglutination (such as IMHA and AIHA) and at low PCV levels. Their immunochromatography test strips are impregnated with monoclonal antibodies and display results in five minutes.

Alvedia canine-cross match test, Lab Test XM (pack of five) (minor and/or major) is based on an immunochromatographic technology that will detect the presence of immunoglobulins and/or C3 components binding to the red blood cell (RBC) surface. It picks up incompatibilities across all canine blood groups (DEA 1, 3, 4, 5, 7, DAL) in 20 minutes.

**Table 4.** Feline blood type compatibility

| Donor blood type | Patient blood type |              |                   |
|------------------|--------------------|--------------|-------------------|
|                  | A                  | B            | AB                |
| A                | OK                 | May be fatal | Possible reaction |
| B                | Reaction           | OK           | Reaction          |
| AB               | Reaction           | May be fatal | OK                |

Woodley (DMS) Rapid Vet H Feline and Canine Tests (pack of five) uses a murine monoclonal antibody on a test card to create an agglutination reaction to show results. This, however, makes them problematic to use in patients who are auto-agglutinating.

Woodley (DMS) Rapid Vet H IC Feline and Canine

Tests (pack of 5 or 10) are likely to replace the original Rapid Vet H agglutination test. Their newer technology means they will work in the presence of agglutination and low PCV levels.

These new test kits use immuno-chromatographic technology impregnated with a monoclonal

antibody, displaying results in five to 10 minutes.

Woodley QuickVet Portable Analyser laboratory analyser with single-use cartridges for Canine and Feline Blood Typing with results available in five minutes.

Woodley (DMS) Rapid Vet H Major Cross-Match Tests – (three in a box) can be used

for both feline and canine species in detecting red cell agglutination.

Manual slide and tube cross-match methods are also available. For further details refer to [www.petbloodbankuk.org](http://www.petbloodbankuk.org) for a full fact sheet that includes a step-by-step guide.

### Step-by-step guide to cross-matching

The following series of images (**Figures 1-12**) offer a step-by-step guide as to how a typical cross-match testing procedure is carried out (in this case using a Woodley (DMS) Rapid Vet H Major Cross-Match Tests kit).

Each test requires:

- blood samples from both donor (EDTA 0.5ml) and recipient (Serum 2.0ml)
- a centrifuge to hold 1.3ml blood tubes
- a stopwatch.



**Figure 1.** Step 1: Add 10 drops (0.5ml) donor sample to the blue top preparation tube using a clean pipette. Cap tube and invert several times to mix thoroughly.



**Figure 2.** Step 2: Transfer four drops (200µl) recipient serum to yellow top reaction tube using a clean pipette.



**Figure 3.** Step 3: Transfer two drops (100µl) from the blue top donor preparation tube into the red top positive control tube using a clean pipette.



**Figure 4.** Step 4: Transfer two drops (100µl) from the blue top donor preparation tube into the green top negative control tube using a clean pipette.



**Figure 5.** Step 5: Transfer two drops (100µl) from the blue top donor preparation tube into the yellow top reaction tube using a clean pipette.



**Figure 6.** Step 6: Incubate. Cap the tubes tightly and invert several times to mix thoroughly. Let all the tubes stand for five minutes at room temperature (20-27°C).



**Figure 7.** Step 7: Transfer one drop (50µl) from the yellow top reaction tube to the clear top reaction gel tube (yellow label) using a clean pipette. Cap tightly.



**Figure 8.** Step 8: Transfer one drop (50µl) from the green top negative control tube to the clear top reaction gel tube (green label) using a clean pipette. Cap tightly.





**Figure 9.** Step 9: Transfer one drop (50µl) from the red top reaction tube to the clear top positive reaction gel tube (red label) using a clean pipette. Cap tightly.



**Figure 10.** Step 10: Centrifuge gel tubes. Correct centrifugation is essential.



**Figure 11.** Step 11: Following centrifugation, remove the gel tubes.



**Figure 12.** Step 12: Interpret and report results – first interpret positive and negative control using the photo identifiers provided.

- negative control – gel tube (green label) should demonstrate a collection of red blood cells at the bottom of the gel column
- positive control – gel tube (red label) should demonstrate a collection of red blood cells at the top of the gel column.

If positive and negative controls do not react as stated, DO NOT proceed with the interpretation of the test.

Cross-match interpretation – interpret clear-top reaction tube (yellow label) using the photo identifier provided. Record the results.

- a positive cross-match (blood cells at the top) indicates the patient is at risk from a transfusion reaction from the donor. DO NOT transfuse using this donor
- a negative cross-match (blood cells at the bottom) indicates the recipient is probably NOT at risk from a major transfusion reaction from the donor.

## Conclusion

In-house, clinically relevant blood typing is a quick and easy procedure that reduces the risk of transfusion reactions and should be performed in both dogs and cats prior to initial transfusion. Cross-matching should be considered in all feline patients because of the discovery of the Mik antigen and other (as yet)

undiscovered antigens that are thought to exist.

When time permits, all canine patients should have a cross-match performed as gold standard; but this is often not practical. It is, however, essential if a canine patient requires a subsequent transfusion and has received blood products four to seven days previously. ■

## Key words

**Antigen** – a substance on the surface of red blood cells that elicits an immune response when transfused into a patient who lacks that antigen.

**Blood type** – the presence or absence of certain antigens on red blood cells. Blood types are inherited.

**Compatibility** – the determination of the compatibility of the patient's and the donor's blood by pre-transfusion testing to ensure that the product will survive in – and improve the clinical condition of – the patient.

**Cross-match** – the finding of exact similarities between a patient's blood and a donor's blood.

**Alloantibody** – a type of antibody directed against antigens recognised as foreign to the host. The antigen is from within the same species.

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## Electronic cigarettes, nicotine and nicotine patches

Nicotine is an alkaloid from the tobacco plant (*Nicotiana* species). It is found in various concentrations in cigarette, snuff and cigar tobacco. It is also available in nicotine replacement therapy (NRT) preparations, such as chewing gum, lozenges, nasal sprays and transdermal patches that are used to help smokers break the habit. More recently, there has been a large increase in the use of electronic cigarettes, also known as electronic nicotine delivery system (ENDS).

Nicotine causes cholinergic effects, with brief central nervous system (CNS) stimulation followed by CNS depression. It initially stimulates the autonomic nervous system causing brief excitation of the adrenal medulla, CNS, cardiovascular system (owing to the release of catecholamines), gastrointestinal tract (parasympathetic stimulation), salivary and bronchial glands and the medullary vomiting centre. This is followed by blockade of the autonomic nervous system, inhibition of catecholamine release from the adrenal medulla and CNS depression.

The oral bioavailability of nicotine is low (Svensson, 1987) as it is subject to 'first pass' metabolism which converts it to inactive

metabolites. In addition, nicotine is a weak base, so absorption in the stomach is low because of the low pH (Table 1). The oral mucosa is the principal site of nicotine absorption and it is also readily absorbed from the nasal mucosa (Svensson, 1987). In addition, the emetic effect of nicotine also reduces absorption (Anderson, 1989).

### Electronic cigarette and refill liquids

E-liquid (or e-juice) is the fluid used in electronic cigarettes. The cigarette generally uses a heating element that vaporises this liquid solution – as a result smoking an e-cigarette is known as 'vaping'.

E-liquid is a solution of propylene glycol, vegetable glycerin, and/or polyethylene glycol 400 (PEG400) and is available in various strengths

of nicotine (Table 2) and flavours – fruity, menthol, liquorice, caramel, aniseed, grape, honey, vanilla, cherry, coffee, for instance.

The amount and strength used depends on the smoker's normal smoking habit. Note the strength may be given only as 'mg' and not mg/ml. The solution is available in a separate bottle (a refill) or in pre-filled disposable cartridges. These products are currently unregulated, readily available on the internet and there are many manufacturers.

Companion animals are at risk of exposure to these products as they become more commonly found in owners' homes, especially when refills of the liquid are stored in large quantities where they might be found by cats and dogs. Only limited information

**Table 1.** Pharmacokinetics and toxicity of nicotine

|                              |  |
|------------------------------|--|
| Half-life                    | Short: 2-2.2 hours in humans and unknown in cats and dogs (Haderdahl and Sereda, 2004)   |
| Urinary excretion            | Depends on urine pH – excretion decreases as urine becomes more alkaline (Benowitz and Jacob, 1985)  |
| Onset & duration of toxicity | Rapid in onset – within 15 minutes to four hours (Hulzebos et al, 1998)<br>Duration – 1-2 hours (mild cases) prolonged to 18-24 hours (severe cases)   |
| Signs of toxicity            | <b>Common signs:</b> hypersalivation, vomiting, ataxia, lethargy, tremor, diarrhoea and tachycardia or bradycardia<br><b>Other signs:</b> depression, respiratory depression, hypotension, collapse, dyspnoea, hyperactivity and hyperthermia; pupils initially constricted and then later dilated<br><b>Severe cases (rare):</b> convulsions and coma. Ventricular arrhythmias can occur and death is usually result of paralysis of respiratory muscles<br><b>Local irritation</b> may occur if e-liquid is splashed in eye; and ingestion may cause throat irritation (Ordóñez et al, 2013) |



\*Suggested Personal & Professional Development (PPD)

**Table 2.** Strengths of nicotine in e-liquid

| Category *  | Nicotine level (mg/ml)            |
|-------------|-----------------------------------|
| None        | 0                                 |
| Extra light | 6 or 8                            |
| Light       | 11 or 12 [ $> 10$ cigarettes/day] |
| Regular     | 16 or 18 [10 - 15 cigarettes/day] |
| Extra high  | 24 [ $> 15$ cigarettes/day]       |
| Super high  | 36                                |

\* NB. Other strengths may be available

**Table 3.** Treatment for e-liquid toxicity

#### Treatment recommended for $>1\text{mg}$ nicotine/kg:

- initial treatment is activated charcoal (induction of emesis not required)
- wash any skin areas exposed to nicotine with soap and water
- observe patient for at least four hours, monitoring TPR and BP
- avoid antacids as increasing gastric pH will increase absorption (Haderdahl and Sereda, 2004)
- sedate with diazepam, if necessary
- treat any convulsions with benzodiazepines or barbiturate
- ensure the animal is adequately hydrated.

is available regarding their effects in animals. In children, however, they generally cause only mild effects (Cantrell, 2013; Ordonez et al, 2013). Death in a puppy was attributed to ingestion of electronic cigarette liquid but the cause of death in this case was not reported (Radnedge, 2014).

Although the Veterinary Poisons Information Service (VPIS) receives many enquiries regarding electronic cigarettes, the majority of animals involved remain asymptomatic. Where clinical effects have developed, the most common sign was vomiting followed by hypersalivation, lethargy, diarrhoea, hyperthermia and ataxia. Severe nicotine toxicity from electronic cigarette liquid is rare (Table 3).

#### Nicotine patches

Transdermal nicotine patches vary in nicotine content from 5-25mg per patch. Experimental studies in anaesthetised dogs have

shown that a short buccal exposure (five minutes) to nicotine patches produces a rapid increase in plasma concentrations with increased blood pressure and pulse. Ventricular arrhythmias were observed in some animals (Herman et al, 2001).

In an experimental study in dogs, nicotine patches were passed within 25-57 hours after ingestion. Of 12 exposures, only two dogs developed any clinical signs – vomiting after ingestion of two patches – despite high plasma concentrations of nicotine. The plasma nicotine concentration peaked within two hours and declined to low concentrations by eight to 24 hours (Matsushima et al, 1995).

Transdermal patches would also pose a risk of gastrointestinal obstruction. Treatment would again be recommended for any ingestion of  $>1\text{mg}$  nicotine/kg bodyweight; and there have been no serious cases

reported to the VPIS with clinical effects limited to hypersalivation and shaking.

#### Nicotine lozenges and chewing gums

In a similar fashion to the range of nicotine concentrations in nicotine patches, the strength of nicotine in anti-smoking therapy lozenges and gums ranges from 1-4mg per piece. An additional area of concern with the chewing gum products would be the presence of xylitol, although not all brands or flavours contain the sweetener. Always try to obtain the complete brand name of any gum involved in a possible toxicity so that xylitol content can be checked.

Again, the VPIS has received no reports of serious cases with these preparations, with clinical effects being limited to vomiting and quietness, although treatment would be recommended for  $>1\text{mg}$  nicotine/kg bodyweight.

#### Cigarettes, cigars, used butts and ash

Nicotine content varies between 9-30mg per cigarette depending on its strength – in contrast, the butts of used cigarettes contain only 5-7mg per piece. Cigars have a higher concentration of between 15-40mg nicotine per item; so for cigarettes, butts or cigars, treatment would be required for  $>1$  item/10kg bodyweight. The ash of any tobacco product contains negligible or insignificant amounts of nicotine, and no treatment would be required.

#### Summary

Companion animals are at risk of exposure to nicotine from a variety of sources, although in the experience of the VPIS, serious cases are rare, with most animals developing only mild clinical effects after ingestion of tobacco and nicotine replacement products, even apparently

concentrated electronic cigarette liquids.

Prognosis is generally good, and it has been suggested that survival beyond four hours is indicative of a positive outcome (Kaplan, 1968). ■

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# Evidence versus anecdote – the raw food debate

Speaking at the BVNA Congress in October, Dr Marge Chandler, senior lecturer in small animal medicine and clinical nutrition at the University of Edinburgh, began her evidence-based lecture by asking the audience, “Where do most pet owners get their information on feeding pets from?” The consensus view was either from breeders, pet stores or the internet – the latter being identified as a particularly unreliable source.

Dr Chandler emphasised the importance of using a hierarchical approach to examine the reliability of evidence put forward either for or against the feeding of raw foods. She suggested that whereas there is a wealth of closely monitored studies in support of commercially prepared pet foods, the arguments in support of raw diets are invariably based on opinion and are not peer-reviewed.

There are many reasons why owners want to use alternative diets – they embrace them as being ‘whole’ or ‘organic’, they may have concerns about additives and palatability, they are attracted by claims for improved health and an idea that these diets are more ‘natural’.

There are very few data on the potential risks of feeding raw foods either, no lifelong feeding trials, and no comparative studies with commercial diets. Most homemade diets are not complete and balanced, and there is a risk of deficiencies. Compensatory supplementation may then create other imbalances, and human supplements are not always appropriate for animals – especially those for vitamin D – and may result in clinical diseases.

Raw foods regularly test positive for contamination with *Salmonella*, *E.coli*, *Yersinia*, *Campylobacter* and *Toxoplasma* and, although pets fed them may appear healthy, they can be faecal ‘shedders’. This represents potential health risks to people as well as other animals – especially susceptible individuals and practice staff who handle animals being fed raw food.

Raw food ‘treats’ – such as pig’s ears and hooves – pose a particular risk with respect to salmonellosis. “And we must remember that the assumption is that people will cook the raw meats that they buy for their own consumption and that this will reduce the risk of infection,” Dr Chandler said. “This does not apply in the case of raw foods fed to pets.”

Turning to the subject of dental health and the feeding of raw bones, the speaker said there is some evidence that bones may remove tartar; but they will not affect plaque or reduce periodontitis; but neither will dry foods. Bones increase the risk of fractured teeth, oesophageal and gastrointestinal obstruction or intestinal perforation. They will not supply high levels of calcium; although bone meal will.

Dogs fed raw bones may develop secondary hyperparathyroidism and it is important to bear this in mind when admitting dogs for dental treatment. Those being fed on raw or homemade diets present a higher risk of complications.

Summarising, Dr Chandler said that in her opinion, the “Gold standard are foods that have been produced by companies that

undertake lifelong feeding trials. The minimum should be to recommend diets that have undergone feeding trials that meet AAFCO protocols and trials”.

Following this lecture, there was a debate and panel discussion on the subject of feeding raw foods, chaired by the then BVNA president, Fiona Andrew, and involving Dr Chandler, Mike Davies, associate professor in small animal clinical practice at the University of Nottingham, Sarah Hormozi from the PFMA and Richard Allport, a referral vet and advocate of feeding raw food from the Natural Medicine Centre in Potters Bar.

The debate was opened by Dr Chandler who gave a very brief reprise of her previous lecture. She said she had three main criteria when assessing foods – they should be complete and balanced, safe, and appropriate for the declared life stage. In her opinion, there are very few trials on raw foods, there is a potential for deficiencies and excesses, increased risk of environmental contamination and problems with raw bones.

Mike Davies observed that dogs do not naturally control their food intake to maintain a balanced diet. He said he was not aware of controlled studies involving raw diets and that they have been shown to induce several disease conditions.

He reminded the audience that the FDA has issued a warning to people handling raw foods, especially pregnant women. He pointed out that 60 per cent of chicken meat is contaminated with *Campylobacter* and he was emphatic that, despite the claims of some raw food manufacturers, freezing does not kill the major contaminating pathogens such as *Salmonella* and *E.coli*.

“It is irresponsible for vets and veterinary nurses to recommend raw foods to their clients,” he concluded.

Sarah Hormozi took the audience through the structure and function of the PFMA and was adamant that member companies took their responsibilities seriously, including the three member companies selling raw foods. She insisted that existing legislation, especially that relating to manufacturing processes and label claims, was adequate, and that policing it was the challenge.

Richard Allport accepted several of the critical technical and clinical points made by Dr Chandler and Mike Davies and admitted that much of what he advocated was by its very nature anecdotal. “Much of veterinary practice is about anecdotes,” he declared.

He said that in his experience, raw diets have a particular use clinically in dogs with chronic bowel disease and those with skin allergies, and that he had not seen any of the conditions described by earlier speakers in any of his patients. “They simply get better,” he said.

In response to a question from the audience, he said it was preferable for people who wished to feed a raw food to use a commercial one that is balanced and safe. He reiterated his belief that dogs fed on raw foods are healthier but admitted that his assessment was anecdotal. ■



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*\*Suggested Personal & Professional Development (PPD)*

## BANDAGING

# Best practice in equine bandaging

Equine wound care can be challenging, time consuming and expensive for clients. Wounds are an all-too-common occurrence in veterinary practice owing to the horse's natural 'fight or flight' instinct and we see many patients with injuries caused by fencing, wire or trauma, such as a kick from a companion.

There are many things for veterinary professionals – especially registered equine veterinary nurses (REVNs) – to consider when treating wounds in horses to encourage optimal healing and a swift return to athletic function.

Before attempting wound care, however, it is important to have some knowledge of how wounds heal so that an optimal environment can be created. The four stages of wound healing are explained in **Table 1**.

Normal wound healing is what we all work towards; although there are 12 key factors that can inhibit the healing of equine wounds (Knottenbelt, 2003). These factors are:

- infection
- movement
- foreign bodies
- necrotic tissue
- continued trauma
- poor blood supply
- poor oxygen supply
- poor nutritional and health status
- local factors – e.g. large tissue deficit
- iatrogenic factors – e.g. incisions, swabbing and use of veterinary instruments
- genetic factors – ponies heal faster than horses
- cell transformation – e.g. sarcoid formation.

If a wound is not healing as expected, then each of these factors should be assessed in turn to help to determine and correct the problem.

### Wound cleaning

One way to minimise the likelihood of the patient developing a wound infection is the use of early lavage and debridement. The area around

the wound should be clipped and sterile wound hydrogel may be applied during this process to prevent stray hairs contaminating the wound. This hydrogel must be removed afterwards so the wound can be thoroughly lavaged. Sterile saline is usually the fluid of choice for lavage.

Antiseptics should be used with caution, as their action can actually compromise healing in some cases. Antiseptic solutions are usually reserved for severely contaminated wounds and only used at very low concentrations. **Table 2** provides a guideline for wound lavage solutions and when to use them.

### Bandages

Bandages have a number of roles in practice and these are displayed in **Table 3**.

Many of these roles are involved in preventing the 12 factors that delay healing – infection, movement and continued trauma, for example. This makes a properly applied bandage a powerful tool for the REVN in practice when assisting with optimal wound healing.

On the other hand, a poorly applied bandage can actually enhance some of the 12 factors that delay healing:

- poor blood supply and poor oxygenation encouraged by a bandage that has been applied too tightly
- movement can be facilitated by a bandage that has been applied too loosely

- continued trauma and infection will be exacerbated by a bandage that has slipped down, allowing the patient/bacteria access to the wound.

This is why it is so important to apply a bandage correctly and monitor it to reduce the risks of any subsequent complications.

Bandages are made up of three layers – a primary layer, a secondary layer and a tertiary layer.

### Primary layer (wound dressings)

This article will focus mainly on bandaging technique. However, wound dressings form the first part or primary layer of the bandage.

It is well known that wounds heal best in a warm, moist environment and this is what we are aiming to achieve with a wound dressing. There are many dressings out on the market now and the best practice is to select one that will provide optimal healing conditions for the specific wound with which you are dealing.

**Table 4** provides a summary of the main types of wound dressings available and when they should be used.

### Secondary layer

The secondary layer is essentially used to keep the primary dressing in place, provide protection and absorption of discharge as well as helping to prevent movement. Materials used for this include a roll of soft

orthopaedic padding and cotton wool.

These padding materials are held in place with a stretchy, conforming, mesh bandage. Care should be taken when applying this bandage. It should never be applied directly to the skin as it can cause damage; and an inch of cotton wool should be visible above and below the bandage once it has been applied to protect the skin of the patient.

Bandage sores are commonly seen on the lower limb of the horse in equine practice. The lower limb of the horse does not contain any muscle, therefore bandages are often applied over large bony prominences, such as the point of the hock and the accessory carpal bone at the back of the knee. Bandage sores develop when pressure is applied over the thin skin in these areas (**Figure 1**).

The following are some top tips for preventing bandage sores:

- applying extra padding in the secondary layer – such as cotton wool – can help to prevent bandage sores from occurring
- ‘doughnuts’ made from rolled-up cotton wool can be applied directly to the bony prominence, before the bandage is put on top, to help to pad and protect it
- using bandaging materials that are at least 15cm wide is thought to reduce areas of focal pressure that can predispose to the formation of bandage sores
- each layer of bandage applied should overlap the previous layer by 50 per cent so that an even pressure is achieved
- apply enough pressure, but not too much. This comes with practice but bandages do not need to be applied really tightly – a good, firm, even pressure is what is required.

**Table 1.** The stages of wound healing (Hollis and King, 2011)

| Stage of wound healing                                 | Action in the wound  |
|--|--|
| <b>Stage 1:</b> Haemostasis (stemming of the bleeding) | Bleeding stops and a clot forms over the wound   |
| <b>Stage 2:</b> Inflammation (natural debridement)     | White blood cells (neutrophils and macrophages) begin a clean-up process. Slough and exudate (discharge) are produced as a by-product. Inflammation is most active 2-3 days after injury |
| <b>Stage 3:</b> Proliferation (true healing)           | A healthy blood supply forms at the edges of the wound to provide a healthy bed for epithelialisation (healing). The wound contracts down in size  |
| <b>Stage 4:</b> Maturation (scar maturity)             | Collagen is laid down to give the wound a greater tensile strength. This process continues many months following injury  |

**Table 2.** Wound lavage solutions and when to use them (Hollis and King, 2011)

| Wound presentation  | Suitable wound lavage solution  |
|---|---|
| First presentation of a very dirty wound or a heavily infected wound with large amounts of devitalised tissue | Sterile saline (0.9%), Hartmann's or lactated Ringer's solution. One litre minimum per 5cm diameter of wound. These fluids should be warmed to body temperature. Very dirty wounds that are heavily infected can be further lavaged with a dilute solution of chlorhexidine (0.5%) or povidine iodine (1%). This should only be required once and should not be continued as the wound begins to granulate, because these products negatively affect wound contraction and epithelialisation. This point is a heavily debated area where there will be contradictions in practice |
| All presenting wounds   | Sterile saline (0.9%), Hartmann's or lactated Ringer's solution. These fluids should be warmed to body temperature  |
| Follow-up and dressing change   | Sterile saline (0.9%) – warmed cans of saline may be useful, especially if the owner is required to cleanse the wound at home   |

**Table 3.** The role of the bandage in equine veterinary practice (Miller-Smith, 2006)

| Role of bandage                               | Benefits to patient  |
|---|--|
| Support (fractures, tendon/ligament injuries) | <ul style="list-style-type: none"> <li>■ helps to reduce pain and swelling</li> <li>■ gives additional support to internal structures</li> </ul>                       |
| Protection                                    | <ul style="list-style-type: none"> <li>■ from infection or other contaminants</li> <li>■ from self-mutilation</li> <li>■ holds dressings in place</li> </ul>           |
| Pressure                                      | <ul style="list-style-type: none"> <li>■ to help stop haemorrhage</li> <li>■ to help to reduce swelling</li> </ul>   |
| Immobilisation                                | <ul style="list-style-type: none"> <li>■ to restrict movement of joints/soft tissue injuries</li> <li>■ to reduce pain levels</li> <li>■ to provide comfort</li> </ul> |



**Table 4.** Different wound dressings and their uses (Packer and Devaney, 2011)

| Wound dressing   | Specific properties   | Typical application   |
|------------------|---|---|
| Foam dressings   | Absorb excessive exudate whilst providing a protective layer. Aid the processes of moist wound healing, granulation and epithelialisation   | <ul style="list-style-type: none"> <li>wounds producing a large amount of exudate</li> </ul>  |
| Wound hydrogels  | Hydrogels provide and maintain a moist wound environment. They donate fluid to the wound and can be used as a filler for a desiccated cavity where they can restore a physiologically sound moist wound healing environment   | <ul style="list-style-type: none"> <li>when clipping around the wound to prevent hair contamination</li> <li>in combination with foam dressings in any type of wound where a moist, warm healing environment is required</li> </ul> |
| Hydrofiber       | Hydrofiber dressings are soft, woven pads of carboxymethylcellulose. These dressings provide a moist wound environment as they transform into a soft gel substance when brought in contact with the wound bed through absorbing exudate. They aid in the debridement of the wound without causing damage to viable tissues  | <ul style="list-style-type: none"> <li>necrotic wounds that require debridement</li> <li>wounds producing a large amount of exudate</li> </ul>  |
| Hydrocolloid     | These dressings provide a moist environment for the wound without causing maceration and were originally designed to soften necrotic tissue to aid in natural debridement in human health care. They are said to promote angiogenesis and fibrinolysis, therefore, they are useful in the proliferation stage of wound healing  | <ul style="list-style-type: none"> <li>wounds that require debridement</li> <li>wounds that are in the proliferation stage of healing</li> </ul>  |
| Silver dressings | Silver has an antimicrobial effect against many types of bacteria and is used to manage infection in wounds. Various types of silver dressings are available  | <ul style="list-style-type: none"> <li>infected wounds</li> </ul>   |
| Alginates        | Alginate dressings are fine, fibrous dressings that absorb exudate. However, alginates should not be used on dry wounds as the fibres may irritate the wound and there is real risk of wound bed desiccation. Alginate dressings actively stimulate granulation tissue formation through the release of calcium ions. Caution, therefore, should be used when applying these dressings to wounds on the distal limb of the horse, where excessive granulation tissue can be a problem | <ul style="list-style-type: none"> <li>wounds producing a large amount of exudate</li> </ul>  |
| Manuka honey     | Manuka honey is formulated into medical grade honey, which has prolonged antibacterial effects. It has debriding, antimicrobial and some anti-inflammatory and antioxidant properties. Normal honey is not recommended as wound exudate dilutes it quickly, and the dilution reduces its antibacterial effects  | <ul style="list-style-type: none"> <li>necrotic or infected wounds</li> </ul>   |

For most bandages in equine practice, two layers of cotton wool and conforming bandage are applied over one layer of orthopaedic padding. However, for a Robert Jones bandage – which is used to immobilise fractures – the bandage should end up six times the original circumference of the limb you are bandaging.

### Tertiary layer

This is the protective outer layer that is usually achieved by using self-adhesive, conforming bandages. These bandages must be applied

carefully as they are stretchy and it is easy to put them on too tight. The aim is to get a neat, even finish, with no areas of focalised pressure or creases.

An adhesive layer can be applied at the top and bottom of the bandage to help keep it in place and to prevent any bedding getting down the top and contaminating the wound.

### Here come the cavalry!

The 'Equine Bandaging Angels' are a group of four equine nurses working in XLVets

practices across the UK. They have been brought together by Georgie Hollis who is a wound care expert and founder of the **Veterinary Wound Library** which provides vets and nurses with specialist advice, clinical support, education and product expertise.

The 'Equine Bandaging Angels' offer a service to veterinary practices by which they come to the practice, review the dressings and bandaging techniques used, and then give a presentation on best practice bandaging.

They also run practical sessions to teach vets and nurses best practice bandaging techniques.

Through this service, the group hopes to standardise wound care in equine practice and to teach techniques that will lead to optimal wound healing for patients.

To contact the 'Angels' call 07917562940, or e-mail [info@vetwoundlibrary.com](mailto:info@vetwoundlibrary.com)

### Conclusion

A bandage is a powerful tool used in veterinary practice

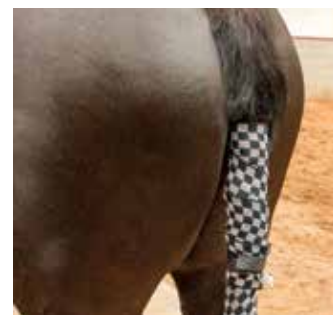
**Figure 1.** How to bandage the hock.**Step 1**

Prepare all your equipment in advance. This should include:

- tail bandage
- appropriate wound dressing
- gloves (non-sterile)
- orthopaedic padding
- cotton wool (half rolls)
- cotton wool doughnuts
- conforming layer
- zinc oxide tape cut into strips
- self-adhesive layer
- protective layer
- curved scissors.

**Step 2**

Ensure that your patient is restrained by a competent handler, wearing the appropriate PPE.

**Step 3**

Apply a tail bandage to your patient making sure that there are no long strands of hair hanging down, as these could contaminate the wound.

**Step 4**

Put on the non-sterile gloves.

**Step 5**

Select an appropriate wound dressing and apply it to the wound with the orthopaedic padding. You should try to work from distal to proximal as much as possible. The overlap between layers should be 50 per cent of the width of the previous bandage to ensure an even pressure is applied.

**Step 7**

Apply a conforming layer over the top of the cotton wool. Apply working from distal to proximal and overlap each layer by 50 per cent of the width of the previous layer. Never apply the conforming bandage directly to the patient's skin because this can cause damage. Always leave 1-2cm of cotton wool at the top and the bottom of the bandage. Do not apply this layer too tightly – a firm, even pressure is all that is required. Fix the bandage in place with zinc oxide tape. Do not tuck it in to secure it as this will create a pressure point within the bandage. For a supportive two-layer bandage, repeat steps 6 and 7.

**Step 6**

Apply the cotton wool over the top of the orthopaedic padding. Start distal and work to proximal. The overlap should again be 50 per cent of the width of the previous layer. A doughnut should be applied over the point of the hock to reduce pressure in this area.

## Step 8



Apply the self-adhesive layer. This should be applied with an even pressure and should look neat and tidy when finished.

## Step 9



Apply the protective layer to the top and the bottom of the bandage. Do not put this on too tightly – a firm, even pressure is all that is required.

## Step 10



Pat your patient and feed him or her treats (if appropriate) so they know that they have been well behaved! Put them back in their stable.

to help patients to achieve optimal wound healing. It is, however, important to have a good working knowledge of wound healing and factors that may interfere with this process. A poorly applied bandage can often do more damage to the wound than no bandage at all, so rules and standards must be adhered to if we are to achieve optimal healing for our patients. ■





# PPD Questions

1. Name five of the 12 factors that delay wound healing
2. Very dirty wounds that are heavily infected can be lavaged with a dilute antiseptic. What concentration of chlorhexidine can be used in this situation?
3. Name three things you can do to prevent the formation of bandage sores in horses

**Answers**

1. Infection, movement, foreign bodies, necrotic tissue, continued trauma, poor blood supply, poor oxygen supply, poor nutritional and health status, local factors (e.g. large tissue deficit), iatrogenic factors (e.g. incisions, swabbing and use of veterinary instruments), genetic factors (ponies heal faster than horses), cell transformation (e.g. sarcoïd formation)
2. 0.5% chlorhexidine solution
3. Applying extra padding in the secondary layer, 'doughnuts' made from rolled-up cotton wool can be applied directly to a bony prominence; using bandaging materials that are at least 15cm wide; each layer of bandage applied should overlap the previous layer by 50 per cent so that an even pressure is achieved; apply enough pressure, but not too much

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**AT VETERINARY  
SYSTEMS**



Wendy Gill  
BVSc MSc(Equine)  
GradDipALT MRCVS

Wendy worked in the equine and veterinary industries before graduating as a veterinarian from Massey University in 1990.

Employment in various roles (including veterinary nursing and lecturing) led to an interest in education and she gained a Graduate Diploma with an endorsement in distance education in 2008. This was followed by a Masters in Equine Science from Aberystwyth University in 2010.

Wendy's major interests include equine behaviour and education within the animal industry, and she currently divides her time between freelance work within these fields and writing fiction and non-fiction.



\*Suggested Personal & Professional Development (PPD)

PAIN

# Pain hurts – but why is it difficult to identify in horses?

In humans, the 'gold standard' of pain detection is a verbalised account (National Research Council, 2009); assessment in animals, therefore, must inevitably be sub-standard. Assessment in equines is particularly difficult because of numerous confounding factors, leading to underuse of analgesics in horses (Dugdale, 2012), which can compromise welfare. Current detection methods are largely subjective and difficult to validate, and behavioural parameters remain the predominant method of pain assessment in horses.

## Effects of pain mechanisms on pain perception

Nociceptive pain occurs when nociceptors (mechanical, chemical, and thermal sensory fibres) detect stimuli peripherally, then send electrical impulses to the central nervous system for processing and interpretation (Figure 1).

## Nociceptive pain

Somatic nociceptors – in skin, muscle, joint capsule, for example – tend to provide sensation which is sharper and easier to localise, while visceral nociceptors – in the intestinal tract, for instance – have lower density with more central system divergence, resulting in a more generalised aching pain (Landa, 2012).

Control systems at the level of the spinal cord and brain modulate the pain sensation, affecting whether perception is increased or decreased (Kane, 2007); therefore, pain is not 'felt' in a consistent manner. An example of modulation is the effect of 'rubbing an area to make it better', whereby afferent sensory fibres to the spinal cord modulate the pain fibres and reduce the sensation of pain. Modulation in the

brain can occur through things such as mood or awareness of injury.

Tissue damage and inflammation release chemical mediators that decrease pain thresholds and increase the area over which it is felt, resulting in hypersensitisation ('wind-up') of peripheral and central mechanisms. This usually only lasts until healing is complete, and it is an adaptive process that helps protect the horse from further harm (National Research Council, 2009), but in the interim can increase reactions to veterinary handling and palpation.

Hypersensitisation is classified as (Kane, 2007):

- hyperalgesia – when an overreaction to a noxious stimulus occurs and a touch will cause intense pain. This usually occurs in the area surrounding the original damage, but may be diffused over the whole body
- allodynia – when a normal non-painful stimulus feels like pain. This may be at a different part of the body to the original damage, and the incidence of this phenomenon in animals is unknown.

Pain can also cause long-term plasticity (altered thresholds and processing) of the pain pathways. Sanchez and Robertson (2014) report that neonatal pain in other species can affect pain perception in later life; thus pain in foals – from veterinary treatment, for example – could lead to increased behavioural responses to pain as an adult.

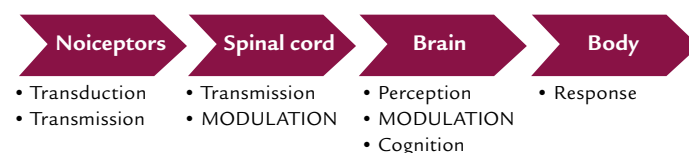
## Effects of stress

Stress shares common physiological pathways with pain, via the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis; resulting in overlapping behavioural signs between pain and fear/anxiety, as well as modulation of pain perception.

In stress-induced hyperalgesia, fear and anxiety increase pain perception both peripherally and centrally (Muir, 2013); therefore, horses stressed by veterinary procedures can have exaggerated pain responses.

In stress-induced analgesia, acute high levels of stress can result in temporary analgesia, rather than hypersensitisation – following serious accidents, for example (Figure 2). Absence of behavioural signs of pain in the presence of injury can delay both diagnosis and implementation of analgesic therapy.

Figure 1. Pain pathways and sites of modulation.





**Figure 2.** Despite a radiating fracture of the scapula, this horse had to be restrained to prevent it galloping further. (Photo: Pauline Nielsen)

### Neuropathic pain

This results when abnormal activity or processing occurs – damage or dysfunction of the nervous system, for example – leading to exaggerated responses to stimuli (Landa, 2012) and prolonged allodynia and hyperalgesia. In humans, this can cause neuralgic conditions and long-term postoperative pain, but the incidence in animals is unknown (National Research Council, 2009). It is,

however, a possible cause of the neuralgia associated with equine head-shaking.

### Types of pain

Essentially, pain can be divided into two broad categories – acute and chronic.

### Acute pain (<3 months duration)

Acute pain is a protective mechanism intended to minimise or avoid damage, but it also has an emotional

component that affects perception (Landa, 2012), so individual behavioural responses will inevitably vary. Unfortunately, many behavioural signs that have been associated with acute pain are non-specific and overlap with signs of stress, training issues and learned behaviour (**Table 1**).

### Chronic pain

Chronic pain can also induce hypersensitivity peripherally and centrally, resulting in prolonged changes in how pain is perceived. As with acute pain, there are no specific signs indicating chronic pain in animals (Landa, 2012) and even in humans the assessment and treatment of chronic pain is only 30 per cent successful (Borsook, 2011).

Identifying and treating it in horses is, therefore, an inevitable challenge. However, Mathews et al (2014) consider that owner assessment via validated questionnaires is essential for monitoring

chronic pain in dogs, and this may be a route to be explored in equine practice too.

Behavioural signs associated with chronic pain in horses include those described for acute pain, as well as an increased likelihood of:

- altered time budgets– time spent on maintenance behaviour such as locomotion, posture, eating, sleeping, and social activity (Ashley et al, 2005)
- decreased eating and bodyweight (Kane, 2007) with a catabolic metabolism (Landa, 2012)
- depression, handling intolerance, and abnormal behaviour (Seksell, 2007).

### Pain detection in practice

The first indicator of pain may be a shift in behaviour, and pet owners can be good at detecting these subtle changes (Seksell, 2007); however, with horses these signs can be overshadowed by other issues such as dental pain versus poor riding.

**Table 1.** Behavioural signs of acute pain

| Behaviour type*       | Altered NORMAL behaviour associated with pain   | Altered ABNORMAL behaviour associated with pain   |
|-----------------------|---|---|
| Locomotion/movement   | <ul style="list-style-type: none"> <li>■ increased (e.g. restless, pawing, kicking, box walking)</li> <li>■ decreased (e.g. standing, reluctance to move)</li> <li>■ lameness of varying degrees</li> </ul>                               | <ul style="list-style-type: none"> <li>■ excessive ‘box walking’</li> <li>■ throwing body against wall</li> <li>■ rigidity/seizures</li> <li>■ head-shaking</li> <li>■ stereotypy (e.g. ‘crib biting’)</li> </ul> |
| Social                | <ul style="list-style-type: none"> <li>■ interaction toward people and other horses reduced</li> <li>■ withdrawn or dull</li> <li>■ increased agonistic behaviour or aggression</li> <li>■ increased or decreased vocalisation</li> </ul> | <ul style="list-style-type: none"> <li>■ excessive aggression</li> <li>■ self-mutilation</li> <li>■ depressed/apathy</li> </ul>   |
| Ingestion/elimination | <ul style="list-style-type: none"> <li>■ decreased or difficulties with eating/drinking</li> <li>■ difficulties defecating or urinating</li> <li>■ changes in chewing patterns</li> </ul>   | <ul style="list-style-type: none"> <li>■ bruxism</li> <li>■ ‘quidding’ of food</li> </ul>   |
| Posture/expression    | <ul style="list-style-type: none"> <li>■ facial grimaces</li> <li>■ head height above ground</li> <li>■ ear position</li> </ul>   | <ul style="list-style-type: none"> <li>■ head pressing</li> <li>■ ‘dog sitting’</li> <li>■ lying on back (e.g. foal colic)</li> </ul>   |
| Other                 | <ul style="list-style-type: none"> <li>■ sweating, pupil dilation</li> <li>■ unwanted reactions to being ridden (e.g. bucking, resisting bit)</li> </ul>  |   |

\* Note that this table is not all-inclusive of every behavioural sign associated with pain. The division into types of behaviour is for ease of reading only and not intended to indicate any specific combination.



People also perceive animal pain differently depending on their culture and experience, so misinterpretation can occur owing to a lack of knowledge – the ‘colicky’ horse enjoying a roll, for example, or the ‘lazy’ pony that actually has laminitis.

Prey species instinctively hide behavioural signs of pain – electroencephalography in deer, for instance, indicated pain when no visible signs were being shown (Landa, 2012). On the other hand, pets showing more obvious signs of pain are more likely to receive analgesics (Seksell, 2007); so, unfortunately, if horses hide pain then essential analgesics may not be given.

Colts do not always show signs of pain following castration, but this does not mean that pain is absent (Ashley et al, 2005); and although anthropomorphism is usually to be avoided, it can help to counteract issues with pain suppression in cases where tissue damage will trigger pain pathways whether or not signs are shown.

**Figure 3.** Aggression owing to learned behaviour can mimic pain responses. When first purchased and in the stable, this mare showed avoidance and anxiety when approached and threats of aggression when touched. However, this behaviour was not seen when she was in the field and was probably learned behaviour associated with pain in the past.



Behavioural signs can help identify severe pain in many species, as well as helping to locate an affected limb or body area (National Research Council, 2009). In horses, some signs or combinations indicate specific conditions and their severity – the laminitic stance, for example – while ‘dramatic’ pain (torsion, for instance) will overcome analgesia (Ashley et al, 2005). The many confounding factors mean that behavioural signs can be unreliable.

Confounding factors include:

- similar behaviour without the presence of pain – learned behaviour (**Figure 3**) or fear/anxiety
- exaggerated response to pain owing to stress-induced hyperalgesia or neuropathy
- behavioural signs caused by pain that vary with circumstances – Gleerup et al (2015) found that, unlike in other studies, horses experiencing low grade pain sought increased interaction with a familiar human; therefore, behavioural signs of pain may be displayed to an owner but not to veterinary staff

- absence of signs, despite pain being present – stress-induced analgesia or learned helplessness (where the horse ‘gives up’ because it cannot avoid the pain).

Pre-emptive analgesia (especially peri-operatively) will decrease hypersensitisation, thereby avoiding both welfare issues and pain-related delays in healing; however, analgesics themselves can affect behavioural assessments. For example, the sedative effects of alpha-2 adrenergic agonists (detomidine, xylazine, for example) outlasts their analgesic effects (Sanchez and Robertson, 2014); whereas opioids (morphine, butorphanol, for example) can be excitatory (National Research Council, 2009). Therefore drug use itself is a confounding factor in identification of pain.

Palpation is one method of identifying and localising pain, because it triggers specific behavioural reflexes and reactions; but it has safety issues if the horse’s response is forceful. Nociceptive threshold testing is already used in

equine practice – using hoof testers for example – and pressure devices can increase consistency between clinicians for palpation. However, although palpation is often essential, it doesn’t measure pain intensity (Ashley et al, 2005) and acts by causing pain, which may exacerbate stress-related factors.

### The problems with physiology

Although physiological criteria are frequently cited for pain detection, routine parameters are unreliable as they are non-specific, inconsistent, and have limited use for chronic pain (**Table 2**). They must, therefore, be interpreted alongside behavioural signs.

### Using pain scales

Mathews et al (2014) consider that every small animal patient should have a pain assessment; however, one survey found that fewer than 10 per cent of small animal practices used formal pain scoring (Coleman and Slingsby, 2007). Although equine staff certainly assess pain, not all clinics use a consistent formal system that is documented within a patient’s records.

**Table 2.** Issues associated with common physiological parameters

| Parameter                              | Issues with use for pain assessment  |
|--|--|
| Heart rate (HR)<br>Blood pressure (BP) | <ul style="list-style-type: none"> <li>■ altered by stress and other factors, even when pain is not present (Landa, 2012)</li> <li>■ behavioural signs of pain can be seen with normal HR and BP (Gleerup et al, 2015)</li> </ul>  |
| Salivary and plasma cortisol           | <ul style="list-style-type: none"> <li>■ used to assess the hypothalamic-pituitary-adrenal (HPA) axis, but this is also affected by circadian rhythm, handling of the horse, and other non-pain-related factors (Landa, 2012)</li> <li>■ plasma cortisol increases with laminitis, but was found to be unreliable for wounds and some postoperative assessments (Ashley et al, 2005)</li> </ul>            |
| Beta-endorphins                        | <ul style="list-style-type: none"> <li>■ increased by non-pain-related factors – e.g. air travel (Landa, 2012)</li> <li>■ increased with visceral pain but not laminitis (Ashley et al, 2005)</li> <li>■ ‘twitches’ increase beta-endorphins (Lagerwaji et al, 1984) but many horses react behaviourally as if they cause pain, possibly owing to insufficient levels or a time delay in effect</li> </ul> |

Standard systems involve assigning values and/or descriptors to different behavioural signs or their magnitude – lameness scoring, for example. Another common system used for many species includes observing posture and activity from a distance, followed by approach and interaction, then an assessment of response to palpation (Muir, 2013). Any of these systems can also be combined with physiological parameters to form a composite system (**Table 3**).

Unfortunately, no one system accurately identifies pain or its severity in every situation.

However, although pain scales have a subjective basis that limits reliability and validity, they do have many advantages, so their use is increasing in clinical practice (**Table 4**).

Accuracy of assessment is improved by noting trends over time, as well as the frequency and duration of maintenance behaviours (time budgets) or specific events – how often and how long a horse spends head-pressing. Although such observations may be time-consuming, time budgets can be particularly useful for subtle, chronic, or postoperative pain (Ashley et al, 2005; Pritchett et al, 2003),

and measurements result in more objective information.

It is believed that humans cannot suppress facial signs of pain, and pain scales have been developed based on changes in various parts of the face (Facial Action Units). Facial pain expressions have been validated in horses using kinematic analysis, via reflective markers and an infrared motion capture system, then given a descriptive scale (Love et al, 2011). Three versions are given in **Table 3** and these have been found comparable to physiological parameters and composite pain scores under various circumstances.

Similarities between the studies suggest good sensitivity and specificity for these systems (although slight variations were noted) resulting in a worthwhile clinical tool that may overcome prey-related pain suppression. They do not locate the site of pain, however, and have other disadvantages in common with earlier systems, so are not a panacea.

Reliability and validity of scales increase with training and experience – and with knowledge of the individual animal's personality (Landa, 2012); therefore, training staff and clients in

**Table 3.** Examples of pain scales used in equine practice

| Acronym | Test  | Description   |
|---------|---|---|
| VAS     | Visual analogue scale                         | A mark is made on a line, or series of images, based on an observer's assessment of severity  |
| DI-VAS  | Dynamic interactive visual analogue scale     | Observation, interaction, and response to touch and movement are added to VAS assessment (Love et al, 2009; cited by Dugdale, 2012) |
| NRS     | Numerical rating scale                        | Descriptions are assigned to different number values, e.g. Obel scale for laminitis   |
| CPS     | Composite pain scale                          | Variable combinations of behavioural and physiological signs  |
| PASPAS  | Post-abdominal surgical pain assessment scale | Multiple parameters assessed at intervals after surgery (Dalla Costa et al, 2014)   |
| FEPS    | Facial expression pain scale                  | Use of facial action units (e.g. ear position, areas of muscle tension) to assess the presence of pain (Lebelt, 2014)               |
| HGS     | Horse grimace scale                           | As above, validated further (Dalla Costa et al, 2014)   |
| –       | Equine pain face                              | As above, with facial action units described in greater detail (Gleerup et al, 2015)  |

**Table 4.** Advantages and disadvantages of pain scales

| Advantages  | Disadvantages   |
|---|---|
| <ul style="list-style-type: none"> <li>■ easy to use for staff and owners</li> </ul>  | <ul style="list-style-type: none"> <li>■ staff (and clients) need training to agree on key signs and descriptions (National Research Council, 2009)</li> </ul>  |
| <ul style="list-style-type: none"> <li>■ help identify the need for analgesia, particularly for acute pain</li> <li>■ increase the use of analgesics and therefore improve equine welfare</li> </ul>          | <ul style="list-style-type: none"> <li>■ confounded by factors such as stress, and variations with time, circumstances and individuals (Gleerup et al, 2015)</li> <li>■ hard to identify subtle signs – e.g. dental pain (De Vries, 2012)</li> <li>■ cannot quantify pain/not linear</li> </ul> |
| <ul style="list-style-type: none"> <li>■ increase the experience of staff in recognising pain (National Research Council, 2009)</li> </ul>  | <ul style="list-style-type: none"> <li>■ false positives and false negatives occur (Gleerup et al, 2015)</li> </ul>   |
| <ul style="list-style-type: none"> <li>■ facial pain scales involve less time and training compared to composite scales, and increase staff safety by avoiding palpation (Dalla Costa et al, 2014)</li> </ul> | <ul style="list-style-type: none"> <li>■ palpation is needed in some cases to localise the pain, and this may increase fear-pain associations</li> </ul>  |
| <ul style="list-style-type: none"> <li>■ improves hand-over of cases between staff and provides documentation for legal cases</li> </ul>  | <ul style="list-style-type: none"> <li>■ cannot be validated with a horse's actual experience (Dugdale, 2012)</li> </ul>  |

the use of the same scale system would enhance pain identification. Reducing confounding effects would also increase validity – for example, by reducing fear and anxiety; use of videos to remove observer effects; and ruling out factors such as poor training and learned behaviour.

### Donkey pain

Donkeys, mules, and feral equids have a reduced range of behavioural parameters indicating pain (**Table 5**), so many pain scale systems will not be valid. Time spent lying down is one of the best indicators of pain in donkeys (Ashley et al, 2005), which is best detected using time budgets. Owner evaluation of subtle changes could also be very important.

### Summary

Overall, pain detection in equines remains difficult; but, by knowing and accounting for as many confounding factors as possible, assessment of behavioural signs increases the probability that pain will be detected and that appropriate analgesia will be given. ■

**Table 5.** Behavioural signs\* of pain in donkeys.

| Signs most likely to indicate pain | Signs less likely to be shown than in horses | Signs unlikely to be seen, or not shown, in donkeys |
|------------------------------------|--|---|
| Standing still                     | reaction to hoof testers                     | restlessness/anxiety                                |
| Lying down                         | postural changes                             | fixed stare   |
| Reluctance to move                 | locomotion                                   | rolling, flank watching                             |
| Depression/dullness                | aggression                                   | limb pointing                                       |

\*Adapted from information in: Ashley et al, 2005; Regan et al, 2015.



# PPD Questions

1. Hypersensitisation as a result of damage to the nervous system is known as:
  - A. nervous pain
  - B. neuralgic pain
  - C. nociceptive pain
  - D. neuropathic pain
2. A common drug type whose sedative effects outlast its analgesic effects are:
  - A. opioids
  - B. corticosteroids
  - C. alpha-2 adrenergic agonists
  - D. non-steroidal anti-inflammatories
3. A key advantage of systems that use 'facial action units' to assess pain is their ability to help:
  - A. identify subtle pain
  - B. overcome pain suppression
  - C. distinguish pain from stress and anxiety
  - D. validate the horse's actual experience of pain
4. Behavioural signs of pain can still be shown, even when no pain or tissue damage exists, in the condition known as:
  - A. learned behaviour
  - B. learned helplessness
  - C. stress-induced analgesia
  - D. stress-induced hypoalgesia

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

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\*Suggested Personal & Professional Development (PPD)

## CATTLE

# Ketosis in dairy herds

I struggle to remember the last time I treated an uncomplicated case of clinical ketosis. Farmers are more likely to treat their own cases today but, more often than not, those ketotic cows that are examined by the veterinary surgeon also seem to have a displaced abomasum. The clinical picture seems to have changed; although our understanding of the disease has come on in leaps and bounds too. Today, for example, we recognise the importance of subclinical ketosis and the impact it has on subsequent disease and production.

## Definitions and diagnosis Type I and type II ketosis

The type I and II ketosis classification was first proposed by Holtenius and Holtenius (1996).

Type I ketosis is characterised by shortage of dietary energy supply, usually when the cow is at peak yield (three to six weeks in milk). This is the traditional form which probably constituted the majority of clinical cases of my early career, and the ketones are accumulated owing to oxaloacetate being limiting in the citric acid (Kreb's) cycle (**Figure 1**).

The cow would have concurrent low blood glucose and insulin.

Type II ketosis, on the other hand, occurs in very early lactation (first one to two weeks weeks) and

was described as being analogous to type II diabetes in humans, caused by insulin resistance. The build up of ketones in this instance is specifically caused by fat metabolism leading to the oxidation of non-esterified fatty acids (NEFAs) in the liver and the subsequent accumulation of too much acetyl CoA to be utilised in the aforementioned citric acid cycle (**Figure 1**).

The cow would be hyperglycaemic and have high blood insulin – and overfeeding in the dry period would be the main risk factor.

For completeness, a third type of ketosis is sometimes described, being linked to the feeding of butyric (wet) silages. **Table 1** lists the characteristics of these three theoretical ketosis types.

## Clinical and subclinical ketosis

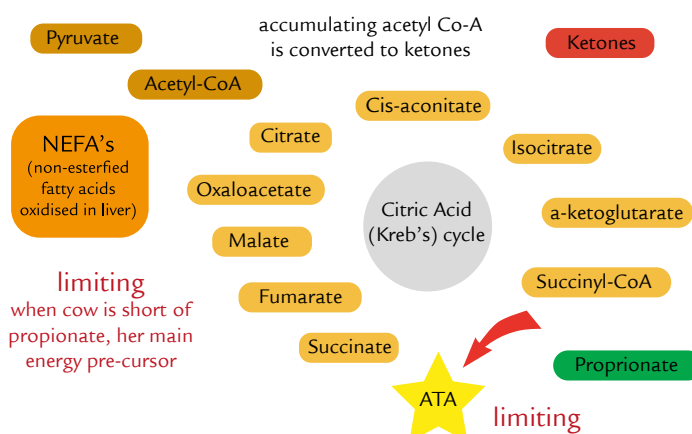
In reality, however, the biochemical distinction between type I and type II ketosis is unclear (Herdt, 2000) and it may be more useful simply to consider clinical ketosis (ketonaemia with observable disease) and subclinical ketosis (ketonaemia accompanied by poor performance but without obvious clinical signs) (Gordon, 2013). This is currently the preferred distinction – so, if like me you never quite got your head around the original type I and type II definitions, you need not worry any longer!

## Diagnosis and cut-offs

Blood betahydroxybutyrate (BHB) testing is the gold standard for the diagnosis of ketosis – but there is not a precise consensus about what constitutes an abnormal level. Different researchers recommend using between 1.0 to 1.4mmol/L in lactating cows, as the cut-off above which subclinical ketosis is diagnosed.

Clinical ketosis can simply be defined as when the cow is showing clinical signs such as altered behaviour and refusal to eat concentrates, regardless of BHB level, but typically the blood BHB may be above 2.0mmol/L (personal observation). The severity of clinical signs seems to depend as much on an individual's ability to tolerate high ketone levels as it does on the absolute level (Herdt, 2000).

**Figure 1.** The Kreb's cycle (simplified) and the relationship with ketosis in times of either energy shortage (limiting oxaloacetate) or high accumulation of acetyl CoA derived from fat metabolism.



**Table 1.** A summary of different types of ketosis (now a largely outdated categorisation)

|                      | Type I   | Type II   | Butyric silage  |
|----------------------|--|---|---|
| Description          | <ul style="list-style-type: none"> <li>underfeeding</li> <li>spontaneous</li> </ul>            | <ul style="list-style-type: none"> <li>fat cows</li> <li>fatty liver</li> </ul>   | <ul style="list-style-type: none"> <li>wet silages</li> </ul>     |
| Highest risk period  | <ul style="list-style-type: none"> <li>3-6 weeks after calving</li> <li>peak yields</li> </ul> | <ul style="list-style-type: none"> <li>first 1-2 weeks after calving</li> </ul>   | <ul style="list-style-type: none"> <li>variable</li> </ul>        |
| Body condition score | <ul style="list-style-type: none"> <li>often thin</li> </ul>                                   | <ul style="list-style-type: none"> <li>high BCS (<math>\geq 3.5</math>)</li> <li>overfeeding prior to calving leading to high visceral fat</li> </ul> | <ul style="list-style-type: none"> <li>variable</li> </ul>        |
| Prognosis            | Excellent  | Poor  | Good  |
| Liver pathology      | None   | Fatty liver   | Variable  |
| Diagnosis            | <ul style="list-style-type: none"> <li>high blood or milk BHB</li> </ul>                       | <ul style="list-style-type: none"> <li>high BHB</li> <li>high pre-calving NEFA</li> <li>liver biopsy</li> </ul>                                       | <ul style="list-style-type: none"> <li>silage analysis</li> </ul> |
| Key intervention     | Post-calving nutrition   | Pre-calving nutrition   | Dilute or stop feeding the offending silage                       |

Now that cow-side blood ketone meters are so readily available, widely used and with excellent accuracy (**Figure 2**), other diagnostic tests are largely defunct. Compared with laboratory diagnosis, the Freestyle Optium blood ketone meters, designed initially for human use, have a sensitivity of 96 per cent and a specificity of 97 per cent as used in the field using a threshold of  $\geq 1.4$  mmol/L to define ketosis (Iwersen et al, 2009). Gone are the days when we would have to fiddle with Rothera's reagent or try and persuade a reluctant cow to urinate on a dipstick!

Cow-side milk tests do, however, still have a place, particularly for routine screening by the farmer, as they are slightly cheaper than the blood test, and milk is easier to obtain. Milk has approximately 10 to 15 per cent of blood BHB levels. Two thresholds are typically used – 100  $\mu$ mol/L has a sensitivity of 83 per cent and specificity of 54 per cent (for subclinical ketosis) and is most useful for herd monitoring; whilst 200  $\mu$ mol/L has a sensitivity of 82 per cent and a specificity of 94 per cent and is a better threshold to use

for diagnosis of clinical cases (Macrae, 2015)

#### Incidence in the UK and costs

Ketosis incidence has been studied extensively in North America. Most recently, McArt et al (2012) found that 43 per cent of cows on four large dairies had at least one episode of blood BHB  $\geq 1.2$  mmol/L, when tested six times between two to 16 days in milk. This is in agreement with Duffield (2000) who estimated the cumulative lactational incidence of subclinical ketosis to be in the region of 40 per cent in the average Canadian herd.

European dairy farms, however, are more diverse, so North American studies do not always reflect what we see at home. A German study (Dirksen et al, 1997) found that around a third of all cows had at least one episode of subclinical ketosis in the first two months of lactation. More recently, Suthar et al (2012) conducted a pan-European study across 528 farms (but not including the UK), and found that the overall prevalence of ketosis (blood BHB  $\geq 1.2$  mmol/L) within cows two to 15 days in milk was 21.8 per cent.

It is important to recognise the difference between a prevalence study, where individual cows are only sampled at one time, and an incidence study where the same cows undergo serial testing.

Berge and Vertenten (2014), using a cow-side milk test with a threshold of 100  $\mu$ mol/L BHB, found that in 85 per cent of 131 western European dairies, at least 25 per cent of freshly calved cows (2-35 days in milk) were ketotic. The UK farms included had the lowest prevalence.

In the UK, clinical ketosis has been estimated to occur in approximately one per cent of lactations (Whitaker et al, 2004). However, subclinical ketosis was found to be present in 10 per cent of cows one to 60 days in milk on any single day (blood BHB  $\geq 1.2$  mmol/L) – although this study selected higher yielding herds (Cooper, 2011).

It is not possible to extrapolate these data to indicate a likely lactational incidence in the UK, but given that McArt's study (2012) had much higher prevalence rates during single sampling occasions, peaking at 29 per cent for cows five days in

**Figure 2.** A cow-side blood ketone meter, available from most high street chemists.

**Table 2.** Effects of ketosis (BHB  $\geq 1.4$  mmol/L) as described by Raboisson et al, 2014

| Disorder/Parameter             | Relative risk/effect |
|--------------------------------|----------------------|
| Clinical ketosis               | 5.38                 |
| Displaced abomasum             | 3.33                 |
| Early culling or death         | 1.92                 |
| Metritis                       | 1.72                 |
| Clinical mastitis              | 1.61                 |
| Lameness                       | 2.01                 |
| Doubling of somatic cell count | 1.42                 |
| Mean milk yield loss (=/- SD)  | 251 (+/- 73kg)       |
| Delay in 1st service           | 8 days               |
| Delay in calving to conception | 16-22 days           |

milk, it is likely our lactational incidence rates are considerably lower than the 43 per cent reported in North America.

A recent US analysis estimated each case of ketosis (subclinical and clinical) to cost an average of \$289 (McArt, 2015). In the UK, the costs of subclinical ketosis have been estimated at around £200 per affected cow (Cooper, 2011). This is comprised of a direct cost of reduced yield (350 litres per case, costing around £60) and indirect costs resulting from poorer fertility, a greater risk of left-displaced abomasum (LDA) and a greater risk of culling.

If subclinical ketosis occurs in a third of all lactations, this metabolic disorder would, therefore, be projected to cost typical UK dairy farms around 0.9ppl.

#### Effects of subclinical disease

The recognition that subclinical ketosis may be a

'gateway' condition associated with other disorders has led to a greater focus on monitoring and controlling it. Many studies have been conducted that demonstrate correlations with other disease and a recent review and meta-analysis by Raboisson et al (2014) has collated the findings (**Table 2**). For example, a cow with subclinical ketosis is over three times as likely to develop a displaced abomasum, more than twice as likely to become lame, produce 250 litres less milk and take around 20 additional days to get in calf, compared to a non-affected herd mate (**Figure 3**).

Given that an estimated 30 to 50 per cent of dairy cows suffer a clinical disorder in early lactation (LeBlanc, 2010), it is easy to see that subclinical ketosis can be thought of as the common thread that may link many disorders together. However, it is difficult to separate 'association' from 'cause'. In fact, it is very likely

**Figure 3.** Ketosis is associated with increased odds of many other diseases, including metritis, mastitis and lameness, which occur in the following weeks and months of lactation. It is not always possible to identify the exact reason why cows such as this become lame, but ketosis, weight loss and reduced digital cushion fat pad thickness could be an important contributing sequence of events.



that there are risk factors common to subclinical ketosis and other diseases associated with it, such as severe negative energy balance, low dry matter intakes and increased fat metabolism in early lactation.

#### Where to now – a disease of the individual or a herd problem?

Whilst there are plenty of individual cow risk factors that have been associated with ketosis (**Table 3**), there are fewer studies that identify herd risk factors.

Stenegärde et al (2012) compared the characteristics of 40 herds with high prevalence of ketosis (and displaced abomasum) with a control group of 20 low-prevalence herds. The high-prevalence group had higher milk yields and were more likely to be larger herds. In addition, several management factors were identified – for example, not cleaning the pre-calving feeding platform daily and

keeping dry cows in one group were both associated with increased odds of having a high-prevalence herd.

One thing that has definitely altered since my early days in practice of treating individual ketotic cows is that the focus in dairy veterinary practice is now less on the individual and more on the herd. Whilst clinically affected individuals deserve good treatment, we should recognise that they are likely to be markers of more widespread problems. Whilst we have learned much about ketosis in the last 20 years, there are still many gaps in our ability to implement the best herd level control.

#### Evolution of ketosis in dairy herds

As a young graduate vet – not that long ago – treating individual cows with ketosis formed part of my daily rounds. Often, the patients

**Table 3.** Examples of risk factors for individual cows to develop ketosis

| Risk factor                  | Increased risk                              | Reference                 |
|------------------------------|---|---------------------------|
| Age                          | Older cows (lactation 3+)                   | Berge and Vertenten, 2014 |
| Calving season               | January-June calvers (Western Europe)       | Berge and Vertenten, 2014 |
| Previous disease             | Milk fever; retained placenta               | Berge and Vertenten, 2014 |
| Cow comfort/behaviour        | Longer standing times in the preceding week | Itle et al, 2015          |
| Body condition in dry period | BCS >3.25 pre-calving                       | Vanholder et al, 2015     |
| Yield                        | Higher colostrum and first test date yields | Vanholder et al, 2015     |



were rather over-conditioned Friesian types – “buttery” would be the kindly farmer description.

Invariably, the call was to a “slow fever”, as this was the colloquial Yorkshire term for the condition, and the diagnosis was not difficult, given the cow’s acetone-smelling breath and her refusal to eat her concentrate nuts (which was more readily apparent in the abreast parlours common at the time). A quick clinical exam followed by a jab with some dexamethasone and vitamin B<sub>12</sub> was normally all it took before I was on my way to the next visit.

Fast forward 20 years, and I struggle to remember the last time I treated an uncomplicated clinical ketosis myself! Of course, farmers are more likely to treat their own cases today, but more often than not, those ketotic cows that are examined by the vet, also seem to have a displaced abomasum.

The clinical picture seems to have changed – and our understanding of the disease has come on leaps and bounds too. Today, for example, we recognise the importance of subclinical ketosis and the impact it has on subsequent disease and production.

### Summary

Ketosis is widespread and important. Many of us would concur from practical experience that some farms have a high prevalence of ketosis and early lactation disorders, whilst others do not. Identifying and promoting the ‘success factors’ that those low-prevalence herds have in common would benefit other farms and their cows. A future article in this series will concentrate on ‘transition cow’ management, and discuss what some of those success factors might be. ■



# PPD Questions

- Which of the following statements are correct about type II ketosis?
  - it is most prevalent 2-3 weeks into lactation, at peak yield
  - it may be associated with insulin resistance
  - it is more severe than type I ketosis
  - it is an out-dated term
- How much is ketosis likely to cost UK farmers?
  - £60 per case
  - £20,000 per farm per year
  - 0.9 pence per litre for all milk produced
  - 0.9 pence per litre for all affected cows
- To which of the following is ketosis linked?
  - higher levels of lameness
  - higher levels of mastitis
  - higher incidence of displaced abomasa
  - lower milk yields
- Above which concentration of blood BHB is clinical ketosis likely to be encountered?
  - 1.0 mmol/litre
  - 1.2 mmol/litre
  - 1.4 mmol/litre
  - 2.0 mmol/litre
- For which of the following herd level risks is there evidence for increasing the odds of ketosis?
  - Holstein herds
  - three-times-a-day milking
  - higher yielding herds
  - poor cow comfort in the dry cows

Answers  
1. B & D 2. C 3. A, B, C & D 4. D – although clinical signs are very dependent on the individual animal 5. C – though there is also evidence that poor cow comfort/longer standing times in pre-calvers increases the risk of ketosis at an individual cow level, and three-times-a-day milking is likely to lead to higher yields

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*\*Suggested Personal & Professional Development (PPD)*

## GOATS

# Neonatal kid care – birth to four weeks

Whether rearing goats commercially or in the back garden, the same basic tenets apply to the care of the neonatal kids. The aim is to provide well-grown, healthy kids, with a well-developed rumen, that reach an adequate weight for weaning, as economically as possible. 'Attention to detail' should be the motto of all goat breeders because attempts to cut corners always end in disaster.

Routine kid care starts at least eight weeks before the expected kidding date by ensuring that the doe is correctly fed during the last trimester of pregnancy and vaccinating her against tetanus and enterotoxaemia about six weeks before the expected kidding date (Lambivac, MSD Animal Health).

**Table 1** lists the conditions that give the newborn kid the best possible start in life.

Kids should be born in a clean, draught-free environment and kidding pens should always be ready well in advance. The dam should kid in clean surroundings in her own pen to which she has been acclimatised for several weeks to allow her time to develop immunity to environmental pathogens.

A clean and draught-free nursery pen should be ready for the kids at least one week before the due parturition date, preferably in an area not used by other livestock for at least six months.

### After kidding

As soon as the kid is delivered, its mouth and nose should be cleared of mucus, the kid dried thoroughly with towels and then placed in a warm environment with its mother. Towelling will help stimulate breathing or respiration can be encouraged by using a respiratory stimulant, such as doxapram hydrochloride (5-10mg sublingually or by subcutaneous or intravenous

**Table 1.** Improving the survival of the newborn kid

- correct nutrition of the pregnant doe, particularly during the last six weeks of gestation
- vaccinate does against clostridial disease to ensure good passive immunity for kids
- monitor parturition and correct dystocias as soon as possible
- supervise all kids to ensure that they suck within one hour of birth
- stomach tube all kids that are weak or not able to suck their dam – give 50ml/kg of colostrum or colostrum substitute within four hours of birth
- monitor dam to ensure she is mothering the kid without excessive pawing and is allowing kid to suck – separate doe from other goats if she is not settling with her kid(s)
- dip all kids' navels in strong iodine solution at birth and again four hours later
- maintain clean kidding environment.

**Table 2.** Routine kid care at birth

|              |   |
|--------------|---|
| <b>Clip</b>  | Cut the umbilical cord short if too long  |
| <b>Dip</b>   | The umbilical cord in iodine  |
| <b>Strip</b> | Squirt colostrum from each teat to check colostrum present and teats functional |
| <b>Sip</b>   | Make sure each kid receives colostrum   |

**Table 3.** Colostrum requirements for newborn kids

| Weight of housed kid (kg) | First feed (ml) | Daily requirement (ml) |
|---------------------------|-----------------|------------------------|
| 3                         | 150 - 200       | 600                    |
| 4                         | 200 - 300       | 850                    |
| 5                         | 250 - 475       | 1,100                  |

injection). Where necessary, the umbilical cord should be shortened and then treated with strong tincture of iodine or antibiotic spray (**Table 2**).

Birth weights are very variable, ranging from over

seven kilograms for a single male down to two or three kilograms in multiple births. Regular weighing of the growing kids allows early corrective measures to be taken – batching of small kids, delaying weaning, increasing



**Figure 1.** Kids from large litters may need to be removed at birth.

concentrate feeding or giving anticoccidial treatment.

It is usual to leave the kid on its dam for at least four days of age to encourage maximum colostrum intake. If the kid is sickly, one of a multiple litter (**Figure 1**) or if the dam is ill – or, as in the case of some ‘first kidders’, aggressive to her young – kids should be removed at birth and placed in a warm environment, under a heat lamp if necessary.

### Colostrum

Each kid should receive colostrum within the first four hours of birth, preferably during the first hour – either directly from the dam or by bottle or stomach tube. Within hours of parturition, the kid’s ability to utilise the colostrum is reduced and the quality of the colostrum from the doe becomes poorer, as she begins to produce normal milk. Colostrum should be fed at a rate of 50 to 75ml/kg three times during the first day.

Anything that increases the kid’s requirement for heat production, such as chilling, increases the demand for colostrum. Housed kids require about 210ml/kg during the first day, while kids outside in inclement weather require around 280ml/kg/day (**Table 3**). Failure to absorb adequate amounts of colostrum leads to high mortality rates in young kids. Even when the dam has plenty of colostrum of good quality,

various factors can prevent its adequate uptake by the kid (**Table 4**). Prolonged parturition or Caesarean section may result in a weak or anoxic kid that is disinclined to search for the teat, and a dam that is unable to mother the kid. First kidders may inadequately stimulate the kids to suck or even refuse to stand to be suckled and kidding unsupervised in overcrowded conditions may lead to mismothering. Kids have difficulty too in sucking goats with pendulous udders or conical teats.

Attempting to bottle-feed a weak or comatose kid may lead to regurgitation and inhalation pneumonia, so any kids that are not sucking well should be fed by stomach tube using a lamb stomach tube and 60ml syringe. An 18-French gauge feeding tube or a urethral catheter long enough to reach the last rib can be utilised in an emergency.

Kids should be fed at the rate of 50ml/kg, or until the stomach feels full. The technique is demonstrated at: [www.youtube.com/watch?v=WbDHu4iUGk8](http://www.youtube.com/watch?v=WbDHu4iUGk8)

Wherever possible, the kid should receive its mother’s colostrum, but if this is not available, frozen, stored colostrum, cow colostrum or commercial lamb colostrum substitute can be used. Colostrum or milk from

**Table 4.** Factors preventing adequate colostrum transfer to the newborn kid

| Maternal factors     | Management factors         | Kid factors           |
|----------------------|----------------------------|-----------------------|
| Short dry period     | Milking before parturition | Weakness              |
| Abortion/prematurity | Leakage of colostrum       | Anoxia                |
| Breed                | Overcrowding               | Prematurity           |
| Parity               | Lack of supervision        | Competition for teats |
| Yield                | Failure to stomach tube    | -                     |
| Litter size          | -                          | -                     |
| Udder shape          | -                          | -                     |
| Mothering ability    | -                          | -                     |

**Table 5.** Maintaining a suitable environment for kids

- keep kids in small groups of a similar age
- avoid overcrowding
- provide clean, dry, well-strawed pens for each batch of kids
- do not mix kids of different age groups – either in the same pen or in one air space
- raise food and water containers above the floor to avoid faecal contamination
- clean deep litter pens every three weeks
- operate an ‘all-in, all-out’ policy for batches of kids, with a minimum of two weeks rest period between batches
- do not ‘hold back’ kids that have failed to reach target weight and mix with younger kids
- strong, well-nourished kids will be less susceptible to respiratory infection.

other herds should never be used if there is a danger of introducing diseases such as caprine arthritis encephalitis virus (CAE) or Johne’s disease. In herds where CAE or Johne’s disease control measures are in place, either the colostrum should be pasteurised or an alternative source of colostrum supplied.

### Housing

Removal of the kid at day five enables disbudding to take place on the fourth day and the kid to be returned to its dam for a further 24 hours before final separation, thus minimising the stress factor for the kid. Should

any problems occur following disbudding, the kid will respond better to maternal rather than human stimulation.

The conditions for optimum kid rearing are given in **Table 5**.

Rearing large numbers of kids together before weaning requires a high standard of management and kids in large groups are more prone to digestive and respiratory problems and growth setbacks. Although kids can be successfully reared in groups of up to 25 kids per pen, rearing kids in smaller groups of six to 10 per pen



means that individual kids are more easily observed, making management easier (**Figure 2**).

Kids will actively seek a sheltered place – mimicking the natural condition whereby the mother leaves the kids hidden from predators whilst grazing, returning to feed them at regular intervals. This can be provided by a ‘kid box’ or ‘house’ within the nursery pen. An upturned, plastic water tank with a doorway cut out of it is ideal as it can be disinfected between batches of kids and provides a ready plaything for the growing kids (**Figure 3**).

On commercial farms, a roofed area at one end of the pen with straw bales on top can provide a cosy area in a larger building.

### Feeding

There appears to be very little difference in the growth rate of kids reared by their dams and kids reared artificially. On larger units, the aim is rapid growth to produce, economically, a healthy well-grown kid with good rumen development (**Figure 4**).

The target weight gain should be 180-200g/day (range 140-250g/day on different rearing systems) – approximating to 1.5kg/week in a well-managed system. Kids will grow equally well on goat milk or good quality milk replacer. Feeding whole milk is more popular for small-scale goat keepers than feeding milk replacer and kids fed on whole milk generally have fewer digestive problems and less bloating than those fed on milk replacer.

Growth performance is similar on goat, lamb or calf milk replacer, provided it is of good quality. However, sheep and goat milk replacers are generally more expensive than cow milk replacers. The key factor determining growth rate is the quality of the milk – particularly its fat and dry matter content. Kids

perform best on replacers where the protein is 100 per cent milk protein, so that, in general, better results are obtained with milk replacers that contain a high skimmed milk powder content (>45% analysis) than with cheaper alternatives.

Whey-/soya-based products – that contain high levels of lactose, are cheaper but less digestible, and are more likely to cause bloat and diarrhoea – are invariably a false economy and should be avoided. Milk replacers that give good results for calves are likely to be equally suitable for kids, but should be fed at a 50 per cent increase on the recommended rate for calves. All milk replacers should be fed at a concentration of 125g/litre (12.5% dry matter).

It is worth remembering that some replacers are formulated to be fed warm, others cold. Attention to detail is critical for successful kid rearing (**Table 6**).

Kids will pick at straw and hay from about 10-14 days of age and rumination is obvious by about the third week of life. Only good quality forage should be fed during the pre-weaning period and an adequate daily concentrate intake must be encouraged before allowing access to forage. Over-feeding of forage before weaning delays rumen papillae development and the transition to a ruminating animal. Concentrates can be introduced after the second week.

Any proprietary feed formulated for calf or lamb rearing is suitable for kids, but it should contain a minimum of 11MJ of metabolic energy and 180g crude protein/kg dry matter (18%), with adequate vitamins and minerals. Although it is often easier to start kids on a coarse mixture, they pick at the mix and leave the protein/mineral pellets. Introducing grower or milk



**Figure 2.** Kids can be reared in groups of six to 10 per pen.



**Figure 3.** A plastic water tank makes an ideal kid house and plaything.



**Figure 4.** Kids can be reared on goats' milk or goat, cow or ewe replacer.

**Table 6.** Requirements for successful feeding of milk replacers

When feeding kids milk replacer:

- feed the correct amount of properly mixed milk, at the correct strength and the correct temperature
- maintain scrupulous cleanliness of feeding bottles, teats, milk machines with all feeding and mixing equipment thoroughly cleaned on a regular basis, using dairy detergent or dilute hypochlorite solutions
- use the same dedicated person to rear the kids as far as possible.

cubes as early as possible, or starting with lamb starter pellets, followed by cubes, will reduce wastage.

### Diarrhoea

Diarrhoea is the commonest problem encountered before weaning in artificially reared kids. The majority of cases are related to nutrition – either directly through sudden changes in concentration or type of milk replacer, changing between goat's milk and milk replacer, overfeeding or varying the temperature at which the milk is fed; or, indirectly, through the use of dirty utensils or contamination of feed.

Kids with diarrhoea should continue to receive milk; but if nutritional scour is suspected where milk replacer is being fed, feeding practices should be investigated and corrected as necessary. Correction of feeding practices and symptomatic treatment will result in the rapid resolution of uncomplicated nutritional diarrhoea, but, where secondary infection is involved, the treatment may need to be more prolonged. Avoid diluting milk with water or oral replacement fluids containing bicarbonate and citrate as dilution inhibits milk clotting.

Nutritional upsets may also predispose to – or coexist with – bloat, colic and mesenteric torsion; all of which are

potentially life threatening.

**Table 7** lists the possible causes of diarrhoea in kids under four weeks of age.

The role of infectious agents in diarrhoea in young kids is often unclear and the specific aetiology of the diarrhoea will often remain unknown. Viruses, such as rotavirus and coronavirus, are commonly isolated from diarrhoeic kids, but are also identified in non-diarrhoeic individuals. Enterogenic *E. coli* can also be isolated from both diarrhoeic and non-diarrhoeic kids. In contrast, the identification of *Cryptosporidium* spp. is always significant. In housed kids older than four weeks of age, coccidiosis is the most important cause of diarrhoea.

### Disbudding

In the UK, disbudding is considered an act of veterinary surgery and should only be carried out by a veterinary surgeon, using a suitable anaesthetic. Kids are the youngest animals that most veterinary professionals will ever routinely anaesthetise and it is important to remember that you are dealing with a neonatal animal.

Kids should be disbudded preferably between two and seven days of age, when the horn buds are small enough to remove with one application of the iron. This applies particularly to males, where horn growth is rapid (**Figure 5**).

**Table 7.** Causes of diarrhoea in kids less than four weeks old

|                                   |   |
|-----------------------------------|---|
| Bacteria                          | <i>E. coli</i> (ETEC)<br><i>Salmonella</i><br><i>Clostridium perfringens</i><br>B & C<br><i>Campylobacter</i> |
| Viruses                           | Rotavirus<br>Coronavirus<br>Adenovirus  |
| Protozoa                          | <i>Cryptosporidium</i><br><i>Giardia</i>  |
| Gastrointestinal parasites        | <i>Strongyloides papillosa</i>  |
| Dietary/nutritional mismanagement | –   |

**Figure 5.** Kids should be disbudded between two and seven days of age.

Do not attempt to use the disbudding iron to remove overlarge buds in older kids as it is stressful for both the kid and veterinary surgeon and the buds will always regrow. It is better to wait until the horns are big enough to be removed with a wire.

However, do take opportunities to examine kids that have been previously disbudded to check for any regrowth, so that your disbudding technique can be modified if necessary. The essential components for successful disbudding are shown in **Table 8**.

Local nerve blocks can be used for anaesthesia, but great care must be taken

to avoid overdosing – other methods are preferable. At the surgery, induction and maintenance with isoflurane in oxygen by mask is simple, quick and safe and recovery is very rapid, but there are health and safety implications for staff members – use a close-fitting mask in a well-ventilated environment and monitor gas levels. As oxygen supports combustion, the mask must be removed before disbudding if a gas disbudder is used.

Alternatively, propofol or alphaxalone can be given by slow intravenous injection into the cephalic or jugular vein and provide safe, short duration anaesthesia with smooth recovery; but neither is licensed for use in food-

producing animals in the UK. Dosages are given in **Table 9** and kids will generally require between 1-2ml of either product.

Most reported kid deaths and problems with prolonged recovery at disbudding are related to the use of xylazine. A combination of ketamine, xylazine and butorphanol (KXB kid mixture) provides a safer anaesthetic with good analgesia. The various xylazine products available in the UK are licensed for use in cattle, ketamine (Anaestamine, Animalcare Ltd) is licensed for use in goats and butorphanol for use in horses.

Although non-steroidal analgesics are not generally recommended for neonates, meloxicam at 0.5mg/kg has been shown to reduce pain for the first 24 hours after disbudding when compared to untreated kids. Butorphanol (0.2mg/kg IV) is suitable for kids and provides analgesia for >2 hours.

### Conclusions

The same basic tenets apply to the care of the neonatal kids – whether rearing them commercially or in the back garden. The aim is to produce healthy kids – with a well-developed rumen – that reach an adequate weight for weaning, as cost-effectively as possible. ‘Attention to detail’ is the watchword and recognition that attempts to cut corners almost always end in disaster. ■

**Table 8.** The essential components of successful and safe disbudding

- kids two to seven days of age (horn buds small enough to remove with one application of the iron)
- short time away from the mother
- short time in the surgery
- short-acting anaesthetic
- rapid recovery
- very hot disbudding iron
- short time of application of the iron (<20-25 seconds total)
- large enough diameter head on the iron (minimum 2cm)
- keep kids warm, dry and draught-free before, during and after disbudding
- weigh the kid if injectable drugs are being used for induction.

**Table 9.** Injectable anaesthetic agents for disbudding

|   |                                 |
|---|---------------------------------|
| Propofol (10mg/ml)  | 3-5mg/kg = 3-5ml/10kg slowly IV |
| Alphaxalone (10mg/ml)   | 4.5mg/kg = 4.5ml/10kg slowly IV |
| KXB kid mixture<br>400mg ketamine : 8mg xylazine :<br>8mg butorphanol<br>[4ml ketamine (100mg/ml) +<br>0.4ml xylazine (20mg/ml) +<br>0.8ml butorphanol (10mg/ml)] | 0.1ml/5kg slowly IV             |

## PPD Questions

1. When should pregnant goats receive a booster vaccination for enterotoxaemia and tetanus?
2. How much colostrum should a housed kid receive in the first 24 hours after birth?
3. What is the commonest cause of diarrhoea in kids under four weeks of age?
4. At what age should kids be disbudded?

**Answers**  
 1. Six weeks before the expected date of parturition  
 2. Approximately 800-1,000ml (210ml/kg; 50-75ml/kg three times in the first day)  
 3. Nutritional, particularly when being fed milk replacers  
 4. Two to seven days of age

### Further reading

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# Common medical and surgical presentations in lizards

A vast number of lizard species are now kept and bred in captivity and each species has its own husbandry and care requirements. Just as is the case with different breeds of dog, many lizard species have specific disease problems to which they are predisposed.

It is impossible to cover the myriad of lizard presentations in one article. So, having scanned the records, I shall discuss the four most common lizards seen in our exotic animal practice during the past 12 months.

## Husbandry

Husbandry is a very important factor in the care of lizards – both at the owner's home and also while hospitalised. In general, the species commonly kept as pets are hardy and robust as long as the proper environment and diet are provided. Unfortunately, despite the large volume of published husbandry information available, some owners still fail to provide the basic husbandry requirements for their pets – and if these husbandry deficiencies are allowed to continue, in the long term they lead to chronic immunosuppression and disease.

Some lizard species will survive for many months, and sometimes years in suboptimal conditions – thus making it difficult for owners to correlate their poor husbandry with the onset of illness (often seen as acute on chronic presentation).

## Species identification

It is important to identify the species being examined accurately. Owners will often give common names when registering animals – and there can be some overlap between species. You cannot always rely on owners to have a correct identification of their own pets.

Some selectively bred 'morphs' – enigma type leopard geckos (*Eublepharis macularius*), for example – are predisposed to specific medical conditions. 'Enigma syndrome' is a neurological condition affecting balance and cognition and only seen in enigma morph leopard geckos. Identifying some common morphs can not only help medically but will also give owners confidence in your knowledge.

## History

Gathering a detailed husbandry and medical history in reptile patients will often take longer on its own than the average UK first-opinion consult. To save time, utilising a proforma husbandry/history form, that can be filled out by the client in the waiting room, will save precious consultation time and ensure a thorough record is collated.

## Handling

Efforts should always be made to use the least restraint possible. Excessive restraint and force often simply leads to increased resistance and the potential of injuring the patient. The cranial coelom needs to be free from pressure to allow ventilation.

Understanding how a particular lizard is equipped to defend itself helps prevent handling injuries to staff or owners. Virtually all lizards are capable of delivering a painful bite – and in larger lizards, this has the potential to be a career-changing bite! Large lizards, such as iguanas and monitors, can deliver a painful

strike with their tail too; and clawing can also cause damage to an unsuspecting handler.

Many species are able to perform autonomy (dropping tail) when restrained. No lizard should ever be held by just the tail and clients should be warned of this phenomenon before handling and restraining species capable of autonomy.

Lizards should be supported from both the pectoral and pelvic girdle and not from the mid-body, which can put strain on delicate internal structures and the ribs.

## Diagnostic sampling

Many of the same diagnostic tests that are performed in companion animals can be carried out in lizards – albeit with a modified technique.

Faecal sampling should be performed routinely in reptile patients. Direct wet mount microscopy, stained cytology and flotation can all be performed.

Venipuncture sites for collecting haematology samples will be species specific. The caudal coccygeal vein is found on the ventral surface of tail vertebrae and is the most common site for venipuncture. A lateral and a dorsal approach to the vessel are described. The caudal coccygeal vein should generally not be used in lizards capable of performing autonomy.

Alternative sites include the jugular and the ventral abdominal veins.



*\*Suggested Personal & Professional Development (PPD)*

## LIZARDS





**Figure 1.** Horizontal beam lateral radiographic projection in a bearded dragon lizard.



**Figure 2.** Panther chameleon unable to ambulate owing to severe nutritional metabolic bone disease.

The sampling rate is often very slow in reptiles – the use of pre-heparinised blood gas syringes helps prevent blood clotting before an adequate sample has been drawn. In reptiles, approximately 0.5ml of blood can be taken for each 100g of bodyweight.

Diagnostic imaging can be a useful part of a diagnostic work-up – radiography, computer tomography and ultrasound may all be used. When radiographs are performed, horizontal beam projections are particularly useful (**Figure 1**). Ultrasound is of particular value when investigating reproductive and other intra-coelomic disease.

### Common conditions Metabolic bone disease

Metabolic bone disease (MBD) is an all-embracing term to describe a whole host of disease processes that affect the integrity and function of bones. To avoid further confusion, in reptile medicine metabolic bone disease should always be further classified as either renal or nutritional.

Nutritional secondary hyperparathyroidism accounts for the majority of MBD cases seen in our practice. In young animals, the bony abnormalities can be called rickets – in adults, osteomalacia is the appropriate terminology.

Clinical signs include swelling and thickening of the long bones and often, the mandible. Pathological fractures frequently occur and tetany, spastic tremors, prolapses caused by muscle weakness, abnormal gait and movement difficulties are common (**Figure 2**). Patients may be anorexic.

Nutritional secondary hyperparathyroidism is caused by either dietary or husbandry deficiencies – or a combination of both. Chronic calcium or vitamin D<sub>3</sub> deficiency, excessive phosphorus, or inadequate exposure to ultraviolet light can all induce nutritional MBD. Even if appropriate UV light is present, if the patient does not have sufficient heat and basking provision, then the D<sub>3</sub> synthesis will be inhibited.

In diurnal lizards, vitamin D is synthesised when the animal is exposed to the correct UV light spectrum (290-320nm). Cholesterol is converted in the skin to inactive vitamin D. The liver and kidneys are involved in the pathways to synthesise 1,25 dihydroxycholecalciferol (1,25-DHCC) which is involved in intestinal absorption of dietary calcium. In clinical cases, the parathyroid gland produces excessive parathyroid hormone in response to hypocalcaemia. This stimulates the resorption

of calcium from the bones to maintain blood calcium levels. As well as bone damage, neurological signs and muscle tremors occur owing to calcium deficiency, and spastic tremors occur as a consequence of increased neuromuscular excitability.

Treatment has progressed in recent years – although in advanced cases the prognosis is still guarded. Owners should be prepared in advance of starting treatment to correct husbandry deficiencies and to expect four to six months of intensive treatment for their pet. The husbandry should be evaluated and deficiencies corrected from the outset.

The medicine of choice for treating bone pathology is calcitonin, used off-licence under the cascade. It inhibits bone resorption by lowering circulating calcium and phosphorus through negative feedback on the parathyroid gland.

Be aware that the reduction in blood calcium following calcitonin administration can induce hypocalcaemic tetany. So either calcium (ionised and total) levels should be monitored during treatment, or pre-treatment supplementation with calcium and vitamin D<sub>3</sub> should be performed before administering calcitonin.

In cases presenting as hypocalcaemic tetany, hypocalcaemia should be addressed prior to calcitonin administration. However, injectable calcium is only indicated in frank cases of hypocalcaemic tetany – oral calcium should be used in all other situations. So as soon as the tetany has been treated, oral calcium should be used instead of injections, to reduce the risk of iatrogenic renal damage.

### Dystocia

Dystocia cases are generally broken down into two categories – obstructive and non-obstructive.

Obstructive dystocia is simply an anatomical inability to pass eggs or a foetus (**Figure 3**). This can be the result of abnormal eggs or foetus (oversized, mis-shaped, damaged), a narrowed pelvis (often following MBD), oviductal structure or extra-oviductal pathology – coelomic masses, abscess, obesity and cystic calculi.

Non-obstructive dystocias are often attributed – rightly or wrongly – to husbandry deficiencies; ranging from an inappropriate nesting site, suboptimal temperature and lighting through to malnutrition, dehydration and muscle weakness owing to inactivity.



**Figure 3.** Radiograph showing a large number of calcified eggs within the coelom.

In all cases, where possible, the cause of the dystocia should be identified to enable the correct recommendation of treatment and prognosis for long-term reproductive health. Clinicians must be aware that eggs can be produced in many lizard species without requirement for male contact – in fact, these infertile clutches are more commonly associated with dystocia than fertile eggs.

In lizards, the first step in investigating suspected dystocia is to differentiate abnormal from normal reproductive behaviour. Many of the clinical signs that an owner associates with dystocia – abdominal distension, palpable eggs, anorexia, weight loss – are actually seen in normal gravid lizards. Often the provision of a suitable nesting site – or to adjust the site or substrate of an existing nest site – is all that is required to stimulate oviposition. If lethargy, reduced ambulation, depression or any other deterioration is noted, then immediate steps are required to resolve the dystocia.

In relation to other reptile emergencies, dystocias in lizards can progress quickly, with patients deteriorating in only a few days. So compared to dystocia cases in snakes and chelonians, those occurring in lizards should be considered an emergency.

Medical treatment of dystocias requires appropriate hospital accommodation. Success with hormonal stimulation will be greater if the patient is housed in a correct, low-stress environment – this will often be its vivarium at home rather than a vivarium in a busy hospital.

Oxytocin is the main hormonal treatment used in cases of non-obstructive dystocia. Arginine vasotocin has been shown to have increased success rates in reptiles compared to oxytocin – however, it is very unstable and not commonly available. Although reported, adjunctive treatment with calcium, progesterone or oestrogen, has very little proven benefit. Calcium injections are associated with the risk of renal damage.

In cases where medical management fails, salpingotomy or ovario-



**Figure 4.** Colonic prolapse in a bearded dragon.

salpingohysterectomy are the surgical treatments of choice. If the patient is not required for further breeding, then salpingohysterectomy is generally performed – removing the risk of recurrence, which is common, owing to oviduct stricture following either prolonged dystocia or salpingotomy.

#### Pre-ovulatory follicular stasis

Clinicians treating large numbers of reptile patients are likely to see as many pre-ovulatory reproductive cases as post-ovulatory (dystocia) ones. These cases are commonly misdiagnosed or diagnosed late because pre-ovulatory follicles are often not visible on survey radiographs. Ultrasound or CT scans are required to identify the pre-ovulatory follicles.

In pre-ovulatory disease, mature follicles develop in the ovary – however, ovulation fails to occur. Husbandry deficiencies and lack of males for mating have both been implicated. Serial ultrasound scans may be needed to differentiate follicular stasis from normal follicular development.

These cases almost always require surgical management – hormonal treatment is associated with, at best, poor success; so ovario-salpingohysterectomy must be performed. Chronic cases will be associated with salpingitis and secondary peritonitis which needs aggressive treatment. Patients with follicular stasis are commonly presented in a very debilitated state and a short period of medical stabilisation is often required to improve surgical success.

#### Cloacal prolapse

In a lizard presenting with cloacal prolapse, the first step is to identify the organ(s) that have prolapsed – gastrointestinal tract, urinary bladder (when present) hemipenes (males), and oviduct (females) can all prolapse. Muscular weakness or – more commonly – an underlying clinical disease causing excessive straining are the likely causes of prolapse. Early identification of the prolapse by the owner and prompt treatment greatly improve the prognosis.

While medical and/or surgical treatment of the

prolapse is a priority, diagnosing the underlying cause is also vital to help prevent recurrence. The colon and oviduct both have a lumen.

The colon is generally smooth-walled and faeces can often be obtained from its lumen. Oviducts have striations not present on the colon and no faeces will be obtained from the lumen.

The thin-walled bladder can readily be identified.

Diagnostic procedures commonly performed as part of a thorough investigation into the cause of a prolapse include: faecal examination (flotation, wet-prep examination, cytology), radiography, ultrasound, haematology, biochemistry, bacteriology.

As a general rule, all prolapsed tissue should be lavaged, cleaned and – if required – concentrated sugar solution can be used to reduce oedema. Following prolapse, tissue rapidly becomes engorged owing to restriction of venous return. If tissue is not viable, then various surgical techniques have been published to facilitate amputation (hemipenes), or resection and anastomosis (colon and oviduct).

When prolapses are replaced, temporary transverse cloacal sutures can be utilised to prevent recurrence while oedema and inflammation resolves

– purse-strings are preferred by some clinicians but, in the author's experience, are more likely to inhibit normal defecation and urate deposition.

Colon prolapse is most commonly associated with enteritis (bacterial, viral, fungal, parasitic) or constipation (**Figure 4**). They can also be seen with straining related to reproductive disease. If identified early in the disease process, they can be rapidly replaced using lubrication and cotton-buds. Care should be taken to ensure the colon is fully inverted.

Temporary cloacal sutures are often utilised to prevent recurrence temporarily. If the prolapse recurs, surgical coeliotomy and colopexy is a very useful and simple technique. If, following the initial prolapse, the tissue cannot be replaced, then surgical coeliotomy to allow gentle traction on the inflamed and friable tissue can be very useful. If required, colopexy can be performed in the same surgery.

Commonly, owing to delay in presenting for veterinary treatment, tissue is already devitalised requiring resection and anastomosis. A published technique associated with good success rates exists that allows resection and anastomosis without need for coeliotomy (Mader, 2005).

Hemipene prolapses are generally not complicated to treat. If the tissue appears

healthy, it can be reduced manually with the aid of lubricant and cotton-buds. The urinary system is separate from the male reproductive tract, so amputation is straightforward and generally problem-free. If only one hemipene is amputated, fertility may be preserved.

Oviduct prolapse is most common with reproductive disease (follicular stasis, dystocia); however, gastrointestinal disease leading to tenesmus can also result in oviduct prolapse. In 'reproductively important' patients, reduction, or resection/anastomosis (if devitalised) can be performed. In the majority of cases, surgical coeliotomy and unilateral/bilateral (as indicated) ovario-salpingohysterectomy is required. If disease is confined to one oviduct, then fertility may be preserved.

Bladder prolapse – although seen more commonly in chelonians than lizards – is generally associated with cystitis or cystic calculi. Cases have been seen following reproductive disease. If viable, the bladder can be reduced and the underlying cause treated. If areas of the bladder are non-viable, resection followed by double-layer inverting closure can be performed in some cases.

As much bladder tissue as possible should be preserved because of the organ's important role in fluid homeostasis. ■

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# Insects – ‘cuddly pets’ or crunchy source of trendy food

Keeping insects as pets is not new. In the 18th century the Japanese kept crickets in cages in order to hear them sing and, long before this, the Chinese kept them, sadly, mainly for fighting purposes. Recently, however, there has been an increase in the popularity of insect keeping and alongside this numerous websites have arisen advertising insects as pets.

There is no doubt that insects are fascinating creatures and that there is a huge variety – stick insects alone account for over 6,000 species. For many people the strange shapes, colours, behaviour and life cycles are fascinating and for those who have limited space and time at home, keeping an exotic pet – such as a stick insect, beetle or praying mantis – can be an attractive option.

An additional advantage may also be that insects’ housing requirements, care and feeding can be more modest than those required by the traditional household pets. They are generally harmless, non-allergenic and, overall, far less expensive to keep. Considering all these attributes, it is perhaps not surprising that their numbers as pets have increased.

## Unforeseen consequences

These exotic creatures may well be relatively easy to keep but this is, of course, once the owner has found out about the environment and food that their new pet requires. For many insects, some careful research is required so that they are provided with the correct space, habitat, temperature, lighting and nutrition.

So far all well and good; but a more worrying side of this new trend in insect keeping has arisen in China, especially

among teenagers and young adults. It is now ‘fashionable’ to keep exotic insects – in particular giant ants – which are imported illegally from overseas and then sold. Chinese regulations bar the importing of giant ants, as they are seen as a potentially invasive species having no natural predators.

Keeping any kind of pet because it is ‘trendsetting’ is worrying. Trends change and the animals/objects that were once ‘all the rage’ are then discarded for something new – baby turtles were a good example of this.

There are now numerous websites selling exotic species, including vast varieties of insects in all their developmental stages. Many provide care instructions but this does not negate the fact that you can order any species of insect without any knowledge of its care requirements. You can also buy insects on ebay usually on a ‘buy now’ basis, although you can also use the bidding system with bids for stick insects starting at as little as 99 pence.

With all these creatures so freely available – and many costing only a few pounds – it begs the question about how much real care some of them will receive and raises the issue of just how ‘disposable’ they are when it is so easy to replace them at such little cost.

## Changing tastes

Entomology has, however, now taken a new turn with the increasing popularity in the west of insects being used for food. Insects have served as a source of food for thousands of years in regions of central and South America, Africa and Asia, with some of the more popular of those eaten being

crickets, grasshoppers, ants and caterpillars. Insects generally contain more protein gram for gram and are lower in fats than traditional meats. They also have about 20 times higher food conversion efficiency than traditional meats, reproduce at a much quicker rate and need far less living space.

Over the last few years specialist restaurants have appeared serving insects as starter, main or pudding courses, advertising dishes such as cricket kebabs, bug burgers and ant guacamole. Indeed, Laithwaites the wine merchants have published a guide to pairing wines with edible insects – so a dry sherry is recommended for drinking with giant water bugs, while a gewürztraminer provides the perfect complement to queen weaver ants.

## Challenging questions

Interesting times; but what is a little more disconcerting are the websites that advocate ‘growing your own’ insects for consumption. Not only is there the worry about the well-being of the insects, it also opens up the question of how they are killed and if they are actually safe to eat.

Home-grown insects are at one end of the spectrum,

while insect farms are at the other. It is legal to farm and sell insects in the UK and there are currently at least a dozen species of insect being sold. According to the Food Standards Agency (FSA) there is nothing in the current legislation prohibiting the sale or supply of insects for human consumption so long as they are safe to eat.

There appear to be no official guidelines for the ‘slaughter’ of insects in the way that there are for meat animals although, unofficially, the insects are cooled into a state of ‘sleep’ and then frozen. Ironically, in the EU it is currently not legal to feed insects to animals that will be eaten by humans, although this is almost certainly in the process of change.

So, in the future, will we be keeping insects as pets or for food? And where do we draw the line? What are the welfare and ethical implications?

An insect diet is most certainly not for everyone, yet it may well be a way forward in alleviating the world’s projected food shortages. Whatever the outcome, it is all a far cry from keeping a few stick insects in an aquarium as ‘unusual’ pets. ■





# The technology you adopt can revolutionise your practice

As practices expand and branch numbers increase, the need for a reliable, high performance and efficient management system becomes a necessity. The need to be able to share client information over multiple sites is becoming an essential and no practice can afford computer downtime with loss of access to client records and associated loss of good client service – not to mention loss of client goodwill.

The development of distributed data systems (DDS) and cluster technology goes a long way to solve the inherent problems of downtime and data accessibility, providing systems in which the components of a software system are shared among multiple computers to improve efficiency and performance and, most importantly, reliability while eliminating the vulnerability of practice data to points of failure in the system.

Traditional practice management system (PMS) technology has always been vulnerable because of the potential points of failure that can stop the system from operating. **Figure 1** illustrates the traditional single site system using a server directly attached to workstations. Performance is rated as 10-100 per cent of the capacity of a server. Management data and client records can be accessed via any terminal. However in terms of reliability the server is a single point of failure (SPOF) in the system. SPOF means that a single point of failure in this area results in the inability to view and/or update client databases. Should it fail there is no access to data by any of the workstations and no client information can be uploaded until the server is fully operational again.

**Figure 2** shows the same single site PMS but using an internet or cloud-based solution. Data is now stored on a server 'in the cloud' which can result in a dramatic reduction of speeds of up to 70 per cent for both data and graphics in the system. Reliability is also compromised as three SPOFs exist: the cloud server itself, the internet connection and the practice server.

In multi-site systems, depending on internet services, reliability is further downgraded as the number of points of failure is increased as the number of sites increases. As with the single site speed of data and graphics, transmission is compromised except at the main site where the server can provide maximum data and graphics speed to the main site terminals (**Figure 3**).

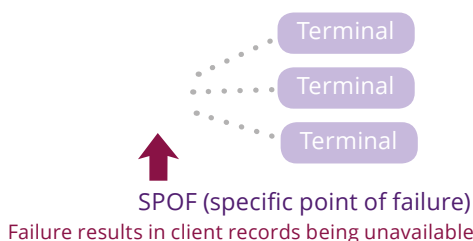
Running reports at branches can also slow down the system and, of course, this effect increases with the number of branches added.

The bigger and more complex veterinary businesses become the more they will have to rely on their practice management systems. The current reality is that as these systems have to cope with more data, graphics and multi-site situations, they become less reliable and the more performance is reduced. Each point of failure that stops the system from working is a source of inconvenience for the practice manager and can significantly affect client service.

## DDS and cluster technology

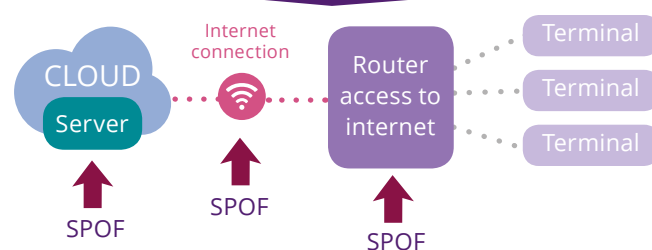
The more challenging the task becomes, the more DDS and cluster technology becomes the way forward. DDS is a real game changer, providing a fail-safe PMS for the practice, eliminating the vulnerability of practice data. Its unique 'tripover' facility allows the continued use of data, eliminating the problems caused by points of failure in the old management systems. At the same time, cluster technology allows the PMS additional computing power, thus spreading the load across various devices to increase transmission speed. This new system of architecture therefore gives both reliability and performance. This revolutionary step towards reliability – developed by the research and development team at AT Systems – has already made its mark on how practices develop and plan for the future.

**Figure 1. Traditional single site PMS**



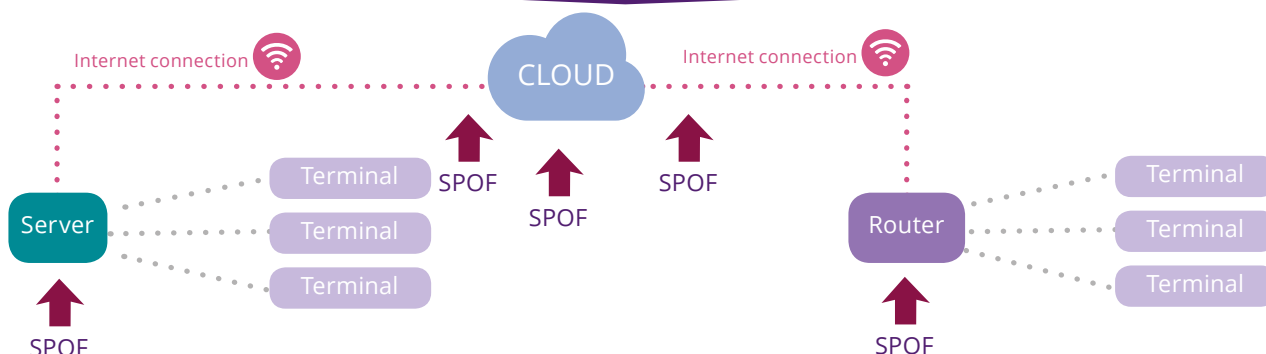
**KEY POINTS:** SPOF=1 Performance level 10-100

**Figure 2. Single site using internet or cloud solution**



**KEY POINTS:** SPOF=3 Performance level 0.1-10

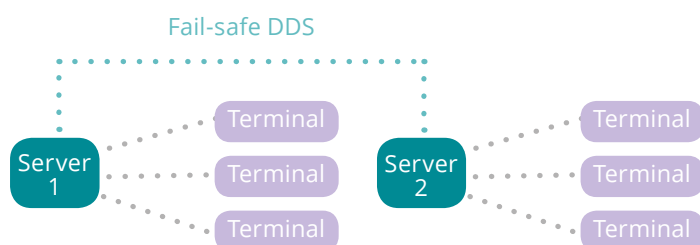
**Figure 3. Traditional multi-site using internet connections**



**KEY POINTS:** SPOF=5 Performance level 0.1-10

Using DDS cluster technology the single site PMS, as shown in **Figure 4**, can be assured of the maximum speed of performance for data and graphics transmission. In addition the two 'cluster' servers work together – acting like a single system and enabling high availability. In a cluster, availability is increased, because a failure in one computer results in the distribution of the workload to the other.

**Figure 4. Single site practice using DDS cluster system technology**



**KEY POINTS:** SPOF=Removed Performance level 100-1000

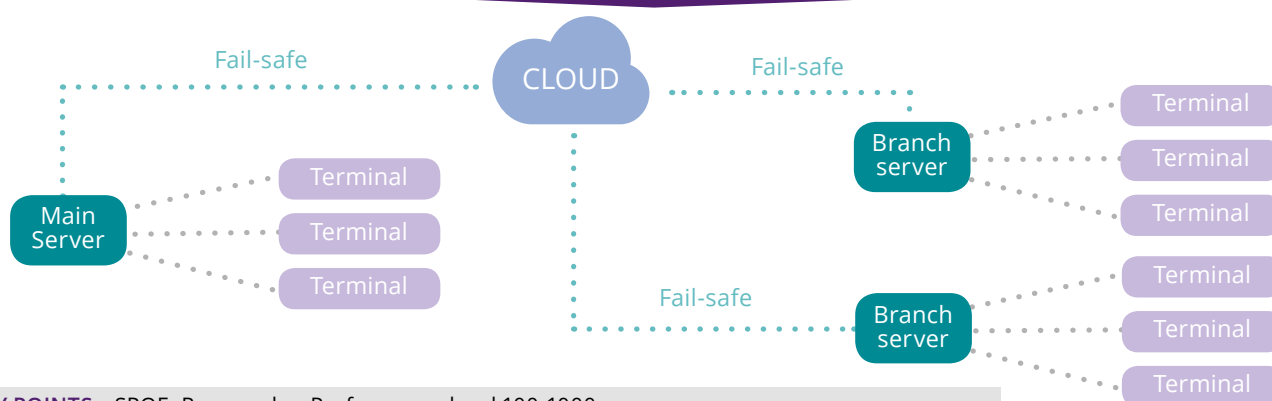
One of the greatest advantages for multi-site practices when using DDS cluster technology (**Figure 5**) is the enhancement of performance. Data and graphic uploading and downloading speeds are not affected by the internet and can be at their maximum speeds. Compared to a traditional multi-site PMS the DDS cluster site eliminates SPOFs. The complete fail-safe option for continuous data uploading and downloading is to have two nodes in each branch.

This means that if a server goes down in a branch practice with two nodes, the tripover system comes into play and data is then accessed via the second node. The practice is therefore always able to provide client and other data to all sites at all times.

If a server goes down in a branch with only one node, then users can log onto the server at another branch via the internet and their terminals can be configured to use this new server, thus enabling continuous working.

Another advantage is the ability for alterations to be carried out working on one site server without the necessity of closing down all the others – as would be the case in the traditional system. A beneficial side effect of this new technology is that the practice always has a complete back up of the system in at least two other places at all times.

**Figure 5. Multi-site DDS cluster system technology**



**KEY POINTS:** SPOF=Removed Performance level 100-1000

## There are numerous benefits to the practice in using DDS cluster technology:

- internet downtime no longer affects the working of the practice. DDS fail-safe facility allows switchover of data
- clients can go to any practice branch in the secure knowledge that all their pet's details will be available
- a much more efficient, high performance PMS
- greater reliability – a system that is in continuous operation
- up-to-date records and data available 24/7 at all surgeries
- secure back up system
- higher performance with much faster data speeds
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Emily Eudall

*Having originally trained in equine management and equitation, Emily has over 20 years' experience working in a variety of equine-based roles – the most prestigious of these being yard manager at the Civil Service Riding Club at The Royal Mews, Buckingham Palace.*

*As her career developed, Emily spent eight years in equine practice, working in both nursing and customer-facing roles. She now combines motherhood with her work as marketing manager for Onswitch, and has recently gained a distinction in the Introductory Certificate in Marketing as she progresses towards the Professional Certificate in Marketing.*



*\*Suggested Personal & Professional Development (PPD)*

## BRANDING

# What is branding?

### Definition...

*'A name, term, sign, symbol or design or a combination of them, intended to identify the goods or services of one seller or group of sellers and to differentiate them from those of competitors'*  
(Alexander, 1960)

*'A rich source of sensory, affective and cognitive associations that result in memorable and rewarding brand experiences' (Schmitt, 1999)*

*‘...something that has actually created a certain amount of awareness, reputation, prominence ... in the marketplace’ (Keller, 2008)*

*'A cluster of values that enables a promise to be made about a unique and welcomed experience'*  
(de Chernatony, 2009)

These descriptions highlight the developments that have taken place in the evolution of brand definition, such that it is now not just about tangible elements but about the intangible, service elements of marketing – values, beliefs, benefits and consistency.

For centuries, cattle farmers have used branding to indicate from which 'ranch' cows have come. Branding has travelled with us through time – and the rise of packaged goods in the 19th century saw producers putting their mark on products to indicate their source. Then things really took off in the 1880s with the likes of Coca Cola, Levi and Budweiser. These brands still remain strong today and have evolved to become not just products, but 'experiences'.

## Benefits of branding

Branding is often thought of simply in terms of logos, marketing materials and website design; but it is much, much more than that.

Branding refers to the perceived image and subsequent emotional response to a company, its products and services. It is about showing your clients what they can expect from you and your products and services, and it differentiates you from your competition.

It is about personality,  
engagement and promise.

A good, strong, cohesive brand will build trust, improve perceptions of value, make you less vulnerable to competition and increase loyalty.

In this article, we will look at the three key elements of branding – brand personality, brand promise and brand positioning.

## Brand personality

To create a brand personality, we first need to carry out a brand audit. So let's start at the heart of the business – with the customer.

Do you know what your customers and potential customers think about you? If you don't, you need to find out. There is no point in

creating a brand aimed at the 'over 60s' if you live in a town full of students! You need to identify your demographic and then understand what its constituents think about you.

What's the word on the street? What do the people of your local town really think of you? What about your key opinion leaders (KOLs) – the pet groomers, pet shops, farriers – who may well also be your clients? All of these people either know you and have made up their mind about you, or don't know you and so will go to the people they trust to find out more about you!

There are four things you need to do to begin your brand audit and it involves a bit of market research.

**Figure 1.** ‘Wordles’ based on three-word surveys can prove useful.



### 1. Street survey

Commissioning a street survey in your local town will give you valuable, qualitative information about what clients and prospective clients think, feel and know about your practice and brand, as well as those of your competitors.

Ask them which three words they would use to describe your practice. This will give you some positive feedback from those who are already your clients and, maybe, some not-so-positive words from those who have decided not to choose you (**Figure 1**).

All this input is valuable and we'll come to that again a bit later...

### 2. Focus group

Another great way to gain qualitative information from your target audience is to arrange a focus group, creating discussion rather than individual responses to questions. This will help you to understand perceptions, preferences, opinions and attitudes towards your existing practice brand.

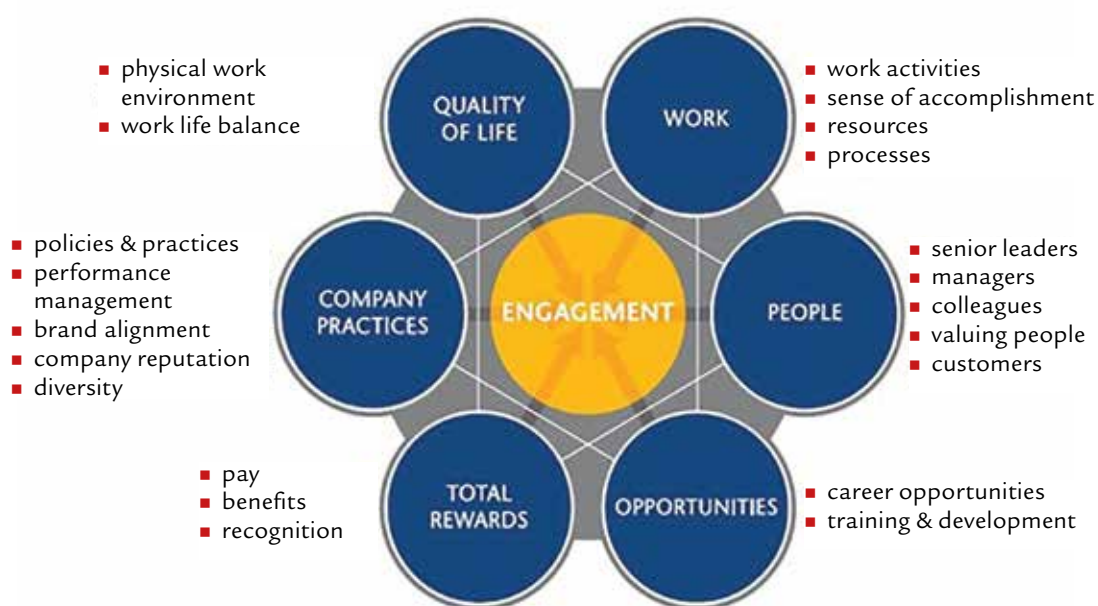
### 3. Key opinion leaders

The third piece of the puzzle is finding out what your key opinion leaders are saying about you. Let's face it, your KOLs are the jungle drums in your local town! They talk to most of your clients and potential clients and are a reliable – if subjective – source of information.

Building strong relationships with your KOLs will create positive word of mouth.

### 4. Client survey

It's a really useful exercise to ask your clients what they think about you, what they like/dislike, what they feel and think about you and would they recommend you? All this information helps you make decisions about your brand.



**Figure 2.** The six main drivers to employee engagement. (Source: Aon Hewitt, *Human Capital Consulting*, 2014).

In addition to this market research, you need to consider employee branding.

#### Employee branding

This is important because your team are your brand. They are integral to bridging the gap between your business and your customer's perception of your business. To achieve effective employee branding, a practice must create an internal communication strategy that engages team members with the vision, values and objectives of the practice.

A good place to start is to measure the current employee engagement levels in your practice by using the tried and tested Gallup Q12 method. This survey is a very effective way of measuring employee engagement and its impact on the outcomes that matter most to your practice.

Comparing your data against national benchmarks will give you an indication of how engaged your team are with your brand. And you will know where you need to improve to increase those all-important engagement levels.

There are six main drivers to employee engagement (**Figure 2**). Remember, employee branding defines the experience of the employee/client relationship and the organisational culture. A brand promise should be made to your employees, just as it is to your customers. This will then promote on-brand behaviours, attitudes and beliefs when dealing with your customers.

So, now you have collected all this qualitative and quantitative data, it's time to do something with it.

#### Brand promise

Decide what your brand promise is to be:

- what do you stand for?
- what do you want to achieve?
- why should people choose you over your competition?

From the data collected, you should have a better understanding of who your clients are, where they come from and what they like or dislike about your practice, as well as what is important to them. Using the responses given in your market research to the question, 'Which

three words would you use to describe ABC Vets?' is a good place to start.

What are the key strengths associated with you? What is it that makes you stand out from the other practices in your town? What can you promise that no other practice can?

It is vital to involve the whole practice team in this process. Everyone should have an input to your mission, values and objectives, this will form part of your brand promise to be communicated to your target audience.

#### Brand positioning

After identifying the brand personality and promise, these now shape brand positioning. This is a critical part of marketing. Are you the Aldi or the Waitrose of vet practices in terms of value and price? Whichever you are – and either is fine – you must be sure to communicate your position clearly and consistently.

Your brand positioning should:

- identify your brand's unique value to your customers



**Case Study****Sandhole Veterinary Centre, Kent**

This established, five-vet, small animal practice has recently undergone an extensive exercise revisiting the personality and promise of its brand. After first carrying out research with local pet owners and business owners to understand how the practice is perceived in the catchment area, the whole team spent a day together analysing their feedback and exploring the 'Sandhole brand'.

Interestingly, in Sandhole's case the logo and visual feel of the practice were already consistent, unique, recognisable and fresh, so there was no need for any changes. What the team felt needed to be conveyed to clients much more overtly was the 'essence' of the practice – all the many things that the Sandhole team do as standard practice, but which may not be standard elsewhere.

The team branding day was a huge success on several levels – the inclusion of the entire team in decisions about practice goals and direction was very motivating, ensuring everybody's buy-in to the branding process. It also highlighted the universally high levels of pride and passion amongst the team for doing things with the 'Sandhole difference'.

The team created a set of practice values, which are now being shared with clients in the form of brochures, posters and an open letter to be sent to every client.

The Sandhole story illustrates that branding is actually a journey, a holistic process involving the whole team and providing the foundations of a practice's marketing strategy (Figure 3).

**Figure 3.** The Sandhole brand.



Determine  
your  
competition

Determine  
their  
positioning

Determine  
your  
customers'  
dimensions

**Decide on the positioning to adopt**

**Figure 4.** To decide your positioning, you might find it helpful to use this simple three-stage process.

- differentiate you from your competition
- match your brand personality and promise
- be difficult to emulate
- be open to change and expansion to enable long-term success
- be believable.

To decide your positioning, you might find it helpful to use this simple three-stage process (Figure 4).

### The branding process is now complete!

From the information you have gathered and analysed, you should be able to make sound decisions and determine your brand personality, promise and positioning.

Look upon branding as a journey of discovery – finding out the public's perception,

be it good or bad, and making positive changes based on the information collected. Look internally to your employee branding to ensure that your team members are on board with your personality and promise. Communicate your brand to your clients and potential clients in a way that shows a cohesive brand strategy and sets you apart from the competition.

And because branding is a journey and your practice will evolve over time – just as client needs will – there will come a time when you'll need to revisit and refresh your brand identity. But that's a whole other story in itself... ■

## PPD Questions

1. What are the three key elements of branding?
2. What are the six main drivers of employee engagement?

**Answers**  
1. Brand personality, Brand promise and Brand positioning  
2. Work, people, opportunities, total rewards, company practices & quality of life

### Data sources

Vox Pop national data, Onswitch 2015

KOL national data, Onswitch, 2015

NPS national data, Onswitch, 2015

Onswitch TeamTrack national data, presented at EBVM Conference, Oct 2014

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# Preparing to sell your practice

Selling a veterinary practice can be a tiresome and time-consuming activity for you as a seller. However, there are steps you can take now to reduce the burden of selling when the time comes. This article sets out steps that prospective sellers should consider before embarking on the sales process, in order to prepare themselves better for the transaction.

It is often the initial 'due diligence' phase of the transaction that can prove to be the most burdensome for a seller.

As part of standard practice, the buyer's legal representatives will send your legal representatives a list of commercial (business and property related) questions. Besides answering these questions, you will be required to provide a substantial amount of documentation – especially with respect to the business – together with that which will have been provided to your sales agent, if you have chosen to instruct one. In preparation for a sale, therefore, it is worth keeping in mind the motivation of a buyer as to their potential 'due diligence' questions.

Remember the buyer would not only like to find out as much information as possible about your business, in order to continue providing a service to your clients without any hitches following the sale; but also to ascertain whether the business is viable as marketed and is capable of continuing with the same level of profitability that may have been demonstrated at the time of marketing.

## Premises

The sale process will most likely involve sale or lease of the premises from where the business is carried out. The buyer's legal representatives will require your legal representatives to provide information on your ownership of the premises and the basis of this ownership. You will also be asked to

provide any supplementary information with respect to the premises – usually in connection with disputes, party walls, boundaries, planning and building regulation compliance, utilities, service contracts, charges, rent and so on.

Ensure, therefore, that you keep a proper account of such information because you will be required to disclose it to the buyer – to the best of your knowledge – together with making available documentation in support of it. In most cases, a seller is also legally required to produce an asbestos survey report and an energy performance certificate. Providing a health and safety file too is seen as good practice.

It is also important to consult your accountant with respect to any tax liabilities that you may face as a consequence of the sale.

## Company

In some instances, the sellers have formed limited companies and the business trades under the name of the company rather than the individual seller. If this is something that your potential sale may be based around, then you will either be transferring the assets of your

company to the buyer and/or its company, or you will be selling the entire company – along with the business and assets – to the buyer.

Consider these options and consult your accountant. Also, ensure that you have complete company accounts available – covering at least the immediate past three years – which clearly demonstrate the profitability of the business carried out by the company.

## RCVS and CPD

Work with the Royal College of Veterinary Surgeons (RCVS) – use their resources and online advice to ensure that you are following best practice and in concordance with the RCVS *Code of Professional Conduct for Veterinary Surgeons*. Also consider how you and your staff are recording their CPD.

It is useful to have CPD information and records compiled in a central folder that is regularly updated. Staff members who have attended CPD courses should be encouraged to brief your whole team on their learnings when they return. Make sure you keep notes of when internal briefings and meetings are held too.

All this will not only show a potential purchaser that you

**"It will speed up the sale process if you have evidence of all your statutory compliance – in the form of policies or correspondence – in one place to present to the buyer"**



*\*Suggested Personal & Professional Development (PPD)*



## "It is useful to have CPD information and records compiled in a central folder that is regularly updated"

invest in the continuing training of your staff, but also that you have a good relationship with your staff members and the practice works as a team. Training is one of the keys to staff retention and this will be very important for any potential buyer.

### Statutory compliance

Review your practice's internal procedures and knowledge when it comes to statutory obligations and make sure you and your practice are compliant, and have the requisite policies in place as evidence of your compliance. Amongst other things, consider:

- whether your Practice Policy Statement is up to date
- that you have notified the Health and Safety Executive if you have radiation equipment
- whether you are Control of Substances Hazardous to Health (COSHH) compliant.

It will speed up the sale process if you have evidence of all your statutory compliance – in the form of policies or correspondence – in one place to present to the buyer. It has been known to make it easier for such compliance to be transferred, so far as the law permits.

You can also use this time to ensure you have in place all the policies and handbooks you need in respect of your practice – from your staff handbook to your business contingency plan. This may seem a great deal of administrative work; but the paperwork you prepare now will be part of the documentation that you will be providing to the buyer during the 'due diligence' process and/or perhaps at the time of negotiating a sale.

Having an organised folder containing the most comprehensive information possible in respect of the

business will not only assist your potential sale transaction to proceed with all due speed, it will undoubtedly make your practice more attractive to a potential buyer.

### Staff

Ensure that all your staff have written contracts of employment in place. These should provide full details of the terms and conditions under which they are each employed by the practice, so that a buyer will be able to rely on the terms of these contracts when the business is transferred.

You will need to review these contracts from time to time, especially where the document relates to a long-standing staff member – to ensure that the pay rate recorded and the hours worked are accurate and compliant with the current law. In particular, make sure that where a contract provides for specific hours to be worked, these hours are still the same and that any alterations have

been recorded in writing and signed off by both you and that staff member.

In addition to this, if your staff work overtime or additional hours, make sure you record this accurately so the information provided to the buyer is accurate. Recording and providing accurate information at an early stage has been seen to prevent many post-completion disputes or claims.

In case there have been any other variations, ensure that these too are duly recorded. Also ensure that any holidays, sicknesses and disciplinary actions are properly noted. You will be expected to have proper disciplinary and grievance procedures in place, which should be part of your staff handbook.

When drafting and negotiating the employment contracts – and self-employed contracts for service – for more senior members of staff, make sure you consider the

## "Ensure that all your staff have written contracts of employment in place"



potential impact on your practice in the event that the staff member leaves. You need to protect your practice's goodwill and to do this you will need to ensure clauses are contained in these contracts that prevent the staff member from competing with you – or the practice's business – when they leave your practice.

Such clauses are known as restrictive covenants, or 'binding out' clauses, and they restrict the geographical area in which the staff member can work for a period of time after they leave your practice. They can also include restrictions to prevent the 'leaving member of staff' attempting to take other members of staff away to work for them or inducing them in any other manner.

It is important, however, that any such restriction is a reasonable one, because any unreasonable and oppressive restrictions can possibly not

be seen as enforceable against the leaving party in the eyes of the law. Specialist legal advice should be taken on the preparation and effect of these clauses.

### Finances

Talk to your accountant before you embark on the sale process. Ensure your management and annual accounts are up to date and discuss with him or her how your business presents.

If you are some time away from marketing your practice, there may be some cost-saving changes that you can make to ensure your business is more profitable. Implement these now, so that the buyer may rely on these later. Additionally, consider whether your fees, opening hours and facilities are competitive. Buyers typically look at the last three to five years of business accounts to ascertain the profitability of

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**"If you are some time away from marketing your practice, there may be some cost-saving changes that you can make to ensure your business is more profitable"**

the business. The cost-saving changes mentioned previously should often be made in advance of the run-up to sale in order to obtain the true value of the changes.

### Warranties and indemnities

In the main sale contract – which will govern the transaction – you will give the buyer certain warranties that are promises about the business and the premises; and the buyer can rely on these.

Additionally, you will indemnify the buyer – often up to the value of the whole

transaction – if, following completion, the buyer discovers that any of your warranties are untrue. It is really important, therefore, that your business has a paper trail leading up to the sale and that everything you tell the buyer can be backed up by your practice's paperwork. ■



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*\*Suggested Personal & Professional Development (PPD)*

## CLIENT CARE

# Catering for blind and partially sighted clients

Rising expectations of customer service are seen by veterinary surgeons as the greatest area of opportunity for the profession, according to a recent 'Vet Futures' survey. Increasing emphasis is, happily, being placed on providing good customer service, but is this also true for blind and partially sighted clients? What kind of experience do they have in practice?

When visually impaired clients visit the practice, staff may understandably feel uncomfortable if they are unsure of how to meet their needs. After all, about 60 per cent of guide dog owners are completely blind; while the remainder have varying levels of residual vision. Therefore, it's likely that every individual will require a different level of assistance.

Although this may seem daunting, there are some very simple adjustments that can make a world of difference and the Guide Dogs' website, [www.guidedogs.org.uk](http://www.guidedogs.org.uk), offers a great deal of useful information on this subject.

In the UK, there are now around 5,000 guide dogs working with adults and children. Each of these dogs will visit a veterinary practice at least once every six months, so it is becoming ever-more important for staff to know how to meet their needs.

### As things stand

In the human medical profession, there is evidence to suggest these needs are not being met. According to a survey by Guide Dogs for the Blind, more than two-thirds of blind and partially sighted people felt their human medical GP practice was not fully aware of their needs; and nearly all participants said they had never received information from their GP in a preferred format – either braille or email.

So how do veterinary practices fare in comparison? As yet, the answer to this question is unknown; but a recent article



published in the journal *In Practice* claims it is 'doubtful' that the veterinary profession performs any better.

Yet all service providers, including vets and GPs, are required by the Disability Discrimination Act (1995) to make 'reasonable adjustments' to their services and premises in order to ensure they are accessible to disabled people.

### Putting the focus on customer care

In June 2015, Judy Taylor, a guide dog owner of nearly 60 years, spoke at the first-ever congress for veterinary receptionists. The event was hosted by the 'Cxclub' – a new endeavour to put customer care at the heart of veterinary practice.

A few volunteer delegates were given a sighted guide into the

conference room by Guide Dogs staff, whilst wearing an eye mask. Members of the audience were then given a challenge – to each wear the eye masks for as long as possible during Judy's talk, in order to briefly experience the world as a blind person does.

Judy said that during nearly six decades of guide dog ownership she has had "only positive experiences" in veterinary practices – although, over the years, some things could have been done better.

### Some practical points

When approaching a blind or partially sighted client, it is helpful to state your name and position at the practice.

Never assume somebody needs help; but rather ask them what assistance they will need – would they like to be guided to their seat or

**"As a matter of courtesy, always speak directly to the guide dog owner, not a sighted person with them"**

into the consulting room, for example. Remember everyone is an individual. Some people will be fiercely independent, whereas others will be more willing to accept help. And don't be hurt or put off if somebody refuses your help.

As a matter of courtesy, always speak directly to the guide dog owner, not a sighted person with them; and do not distract or fuss the dog when it is working – or at the very least, without asking the owner's permission first.

Approach the client and use his or her name when it's their turn to enter the consultation room and introduce other staff members who may be present, so the client knows who is in the room and doesn't get a shock when a previously silent person speaks.

In the consulting room, if you approach, examine or administer treatment to the dog, talk the owner through it as you go. You could also let them palpate something on their dog or feel a plastic model to help explain different concepts.

Don't be afraid to ask questions about the health status of the dog – most guide dog owners will carry out regular examinations, grooming and body condition scoring on their dog. Visually impaired clients may also have some useful sight, or live with sighted people. Therefore, they are no less likely to provide helpful information or clinical history than sighted clients.

### Concerning payments

Generally, the Guide Dogs charity will settle invoices for work carried out on guide dogs. However, if the client is required to make a payment, he or she will, in most cases, be able to manage cash or credit/debit card transactions without any problems.

Nevertheless, do ask them if they need any assistance – maybe simply putting their card in the machine for them, for instance. If you need to give them any change, first put the coins into their hand, then the notes.

### Being a sighted guide

- if you are guiding someone, stand on their right (the dog will always be on the left)
- let them take your left elbow/arm
- don't grab or push them in a certain direction
- describe where you are going, telling them the approximate number of steps until you turn in a different direction or approach a door, slope or hazard
- tell them if the door opens towards or away from them
- when you enter a new room, describe its function, size and layout
- it's easy for a blind person to lose their balance, so make sure they have something to rest on, such as a table top or wall – don't leave them in the middle of the consulting room
- if you are guiding someone to a chair, it may be helpful to place their hand on the top of the chair so they can gently guide themselves into it.

Find out more on how to be a sighted guide at [www.guidedogs.org.uk](http://www.guidedogs.org.uk)

### Managing medicines

Prescribing medicines and carrying out procedures on guide dogs require extra consideration. The *In Practice* article gives some useful advice on this.

It is challenging for blind and partially sighted people to measure liquids or administer a certain number of drops, so these types of medication are best avoided. It is also

very difficult for them to ensure tablets given in food have been consumed, so the direct oral route is best. Ask the client if he or she is happy to do this and if they would like to practise. In the end, it may be necessary to arrange a series of appointments so that medicines can be administered by a veterinary nurse.

Some clients may need instructions or other information in an appropriate format – such as large print or text/email (which they can then convert to audio). It's worth making a note of the client's preferred format for information in their records, to save asking them each time they come in for an appointment.

It can be problematic if more than one medication at a time is being prescribed – if they are in similar packaging you may wish to put one of the medications into an oversized packet. Ask the client if they would like to feel the medication and its packaging so they know which one is which.

Remember, guide dogs should not work for 24 hours after being given a sedative or anaesthetic, so if unexpected or immediate procedures are required, the client will need an alternative method of getting home safely.

### Physical layout

Since 2004, service providers have had a legal duty to make reasonable adjustments to their premises in order to overcome any access problems for disabled people.

Think about any hazards in the circulation routes around your

practice or in the car park. The surgery should be well-lit with good colour-contrast in the décor, as well as appropriate demarcation on glazed walls and doors.

Good signage is also important – make sure there is high colour contrast between the text and background and that you use the recommended size and fonts.

### Summary

By making all practice staff aware of these simple adjustments, you can go a long way to ensuring your visually impaired clients have a positive experience and – at the same time – boost staff confidence in their ability to provide for these clients. ■

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**"I want people to see me as an ordinary person who just doesn't see the world as they do"**  
[Anonymous, Guide Dogs focus group]



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# Industry Profile



**Your name:** Sean Wensley,  
BVSc MSc Grad.DMS MRCVS  
**Position:** President  
**Company:** British Veterinary Association  
(BVA)

## What first attracted you to the veterinary profession?

I was fortunate to grow up on the Sefton coast, north of Liverpool, where I spent most of my time exploring the sand dunes, beach and pine woods, and enjoying their fantastic wildlife – including red squirrels, natterjack toads, bee orchids and huge winter flocks of migrating birds. I wanted to work with animals and was drawn to a profession where I felt I would be trusted and appreciated for a scientific and personable approach.

## How did your career evolve after qualification?

During vet school I had received a Universities Federation for Animal Welfare (UFAW) scholarship to research the welfare of caged pet birds, which sparked my interest in animal welfare science – the science of understanding how animals perceive the world, and what they need and want from their perspectives.

This led to my studying for a Masters in Applied Animal Behaviour and Animal Welfare. I went on to work as a companion animal GP – including in a companion animal and exotics practice – but I also enjoyed finding ways to pursue my interest in animal welfare beyond clinical practice.

As a student I had received a BVA travel grant to assist with the Uganda Owl Conservation Project and after qualifying I went on to assist with animal welfare and conservation projects in China, India, Europe and the Caribbean. I became a committee member of the BVA Overseas Group and liked being able to apply my passions for animal welfare and conservation to the BVA's work. I went on to join the Companion Animal Welfare Council, BVA Ethics and Welfare Group and the committee of the Animal Welfare Science, Ethics and Law Veterinary Association (AWSELVA), and became an honorary lecturer in animal welfare at Nottingham Veterinary School.

In 2008, I joined the PDSA as senior veterinary surgeon for communication and education, helping the charity to promote companion animal well-being and the human-animal bond to the UK pet-owning public.

## What are the most significant changes to the veterinary profession you have witnessed since qualification?

'Feminisation', 'corporatisation', 'specialisation' and the growth of technology are trends of which we are all aware. From the perspective of my own interest in animal welfare, I think attitudes have changed considerably. A decade ago, there was some dismissal of animal welfare science as a

professional interest. Now, there are animal welfare lecturers in vet schools and beyond.

Society is becoming more aware and concerned about how animals are treated and its expectation of the veterinary profession to advocate for the best interests of animals – not only in consulting rooms, but also the public arena – is growing. The profession is responding. In September, I represented the BVA at the World Veterinary Association General Assembly, where animal welfare is being developed as a strategic priority, and 'Vet Futures' – the joint BVA/RCVS project preparing for and shaping the profession's future – has also identified veterinary leadership in animal welfare as a priority.

## What do you think are the most critical issues facing the profession today; and how should they be tackled?

'Vet Futures' has also been asking this question this year, and has been consulting widely with the profession and relevant external bodies. Its findings and next steps will be communicated at the BVA Congress at the London Vet Show in November. Pressing global issues concerned with climate change, biodiversity loss, animal welfare, food security, waste and inequality and antimicrobial resistance are coming to the fore and the profession will need to apply its many skills across increasingly diverse areas.

At the same time, such global challenges can seem a distant irrelevance to veterinary professionals who are not enjoying their careers – whether through poor mental health, perceived low public status or career dissatisfaction. These issues need to be tackled with strategic approaches, which is what the BVA's strategy and the 'Vet Futures' project are both doing.

## During your years of association with the BVA, what are the most significant changes you have seen in the organisation?

The BVA that I have known has always been very welcoming and committed to promoting its members and the profession; yet there is always a challenge to convey this and to promote member engagement. Our 'Voice of the Veterinary Profession' survey panel, comprised of BVA members, has been invaluable in generating increased media coverage, coupled with a willingness to take an animal welfare-focused stance on high profile issues such as non-stun slaughter.

This translates into increased member interest and engagement, and this year we received a record number of applications for our vacant committee positions.

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**"Society is becoming more aware and concerned about how animals are treated and its expectation of the veterinary profession to advocate for the best interests of animals – not only in consulting rooms, but also the public arena – is growing"**

### What will be the main aims of your presidential year?

I want the BVA to do all it can to help deliver on society's expectation that veterinary professionals will be advocates for the best interests of animals – both in our clinical work and in the public arena. This will involve giving increased visibility of the ways in which veterinary professionals advance animal welfare every day, as well as expanding the association's animal welfare resources and advocacy, building on our non-stun slaughter campaign.

During my year as junior vice-president, I have been leading the development of the BVA's animal welfare strategy, in consultation with the profession. I will move to delivering this during my presidential year.

The animal welfare strategy will recognise that animal welfare competes for attention in a complex world. Global meat and dairy consumption, for example, is set to double by 2050, but environmental, animal welfare and human health impacts are now widely recognised. In line with both 'Vet Futures' and the 'One Health' concepts, the BVA will promote the profession's role in ensuring farmers are rewarded for producing safe and accessible food that promotes the long-term health and well-being of farmers, citizens, farmed animals and the natural environment.

These challenges are of increasing interest to younger vets and I will be committed to helping develop the Young Vet Network. We have an excellent relationship with the Association of Veterinary Students and need to make sure we continue to offer the support and representation that is needed in the years following graduation.

### What are the association's priorities?

To be modern, proactive and relevant for veterinary surgeons, wherever they are working and at whatever stage of their career. The BVA's current governance review is making sure we can be exactly that. I shall build on our outgoing president, John Blackwell's, excellent forward-looking work on both this and 'Vet Futures'.

Through the governance review we are building strengthened relationships with the association's specialist divisions for the good of the whole profession, we are looking at new ways to improve member engagement, and we are promoting equality and diversity. In my first day as president, I attended a meeting of the British Veterinary Lesbian, Gay, Bisexual and Transgender group, to whom we are offering our full support and encouragement.

As the voice of the veterinary profession we have also developed – through BVA Council – a set of 10 priority issues on which to focus our attention and campaigns during the coming year – from promoting the value of vets and responsible pet ownership to veterinary surveillance and endemic disease eradication. We are also in the process of undertaking a major piece of member research, following on from our 2012 member survey, and we are committed to responding to what members tell us directly.

### Do you think that global initiatives such as 'One Health' make any real difference at a grass roots level?

Yes. I think that important concepts such as 'One Health' need to be broken down into their individual, community, national and international levels. For example, some practices, acting at the community level, have partnered with their local NHS to highlight the dangers of passive smoking to pets and people, and

are jointly incentivising quitting, while individuals' prescribing practices will influence the likelihood of antimicrobial resistance developing.

It is important to take a 'One Health' approach and recognise that vets, doctors and dentists are each responsible. It has not been helpful (in the past) to shift criticism from one to the other.

### There is a general feeling that Vet Futures and EBVM are just trendy initiatives that divert attention from the real (and unpalatable) action needed on significant problems – companion animal welfare, for instance – for which there is already ample evidence that the profession is failing to address. Comments?

I'm not sure that there is this feeling.

'Vet Futures', for example, has enjoyed a high degree of engagement with veterinary professionals. The BVA has received positive feedback about forming a strategic relationship with the RCVS to prepare for – and shape – the profession's future.

'Vet Futures' is focusing – rather than diverting – attention, and drawing many issues into discrete themes and action plans. One of these themes will cover veterinary leadership in animal health and welfare, both within clinical contexts and in the broader public arena.

Evidence based veterinary medicine (EBVM) is an important contributor to achieving good welfare outcomes for animals in clinical settings. Companion animal welfare problems should be tackled by individuals (reporting procedures to the Kennel Club, for example), practices (educating owners through local media) and associations (BVA creating policy and campaigns). These approaches will flow both from 'Vet Futures' and from the BVA's animal welfare strategy.

### What would be your assessment of the current relationship between vets and agriculture as a whole? How can those relationships be improved; and do you think that Defra is fit for purpose or actually cares any more?

Vets remain valued and trusted members of rural communities, but poor profitability in some farming sectors affects the ability of farmers to employ veterinary services, to the potential detriment of animal health and welfare. Government pressures towards greater efficiencies have created strained relations with veterinary surgeons, for example in tendering for bTB testing – which the BVA opposed. The reduction of disease surveillance capacity has further reduced the profession's confidence in government.

It should be recognised that it is a mixed picture across the UK. The profession is fortunate to have strong veterinary champions in government channels through our four chief veterinary officers (CVOs), but the relationship between the profession and the four UK governments is different.

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**"Government pressures towards greater efficiencies have created strained relations with veterinary surgeons . . ."**



More broadly, important questions are being posed about the sustainability of animal agriculture in a world of climate change, and its implications for animal welfare, biodiversity loss and human health. ‘Vet Futures’ and the ‘One Health’ concept recognise that vets must help ensure farmers are rewarded for producing safe and accessible food that promotes the long-term health and well-being of farmers, consumers, farmed animals and the natural environment.

The BVA will continue to promote the value of vets to government and to demonstrate the commitment and expertise of the profession in addressing the contemporary challenges facing agriculture.

### What next for the veterinary profession?

The ‘Vet Futures’ action plan will ensure the most qualified minds are directed to the profession’s most pressing challenges – both in our daily work and globally – while the BVA will implement all of the changes that it has prepared for this year to make us even more modern, relevant and effective. We will keep working hard to grow our visibility in the media, to make sure we can promote the positive work done by vets and keep demonstrating the profession’s value and ethical approach.

Growing evidence for the societal benefits of companion animals will help ensure a growing status for companion animal practice, while veterinary medical and surgical advances will remain subject to ethical appraisal to ensure we keep doing what we *should* rather than simply what we *can*.

The BVA will lobby for the protection of the title ‘veterinary nurse’ to give our VN colleagues the status they deserve. We shall increase our focus on present-day challenges, such as protection of biodiversity, climate change mitigation and sustainable and healthy consumption of animal-derived foods, as part of the profession’s role in humane sustainable animal agriculture. In this context, the BVA will work to make the world a better place *for* vets and a better place *because of* vets.

### What do you do when not engaged on BVA matters?

I try to get out into green space and see wildlife whenever I have a chance and I especially like seeing wildlife that marks the shifting seasons. At the moment I’m receiving messages from friends and family in Formby to say that the migrating pink-footed geese are returning from Iceland. They fly above the north-west coast in noisy skeins of thousands.

Now that I’ve moved to London for my presidential year, I’ll be listening out for migrating redwings at night – small attractive thrushes that arrive for the winter from Scandinavia are a sure sign of autumn. At home in Northern Ireland, my fiancée Jenny and I live near to Belfast Lough where there are eiders, seals and gannets that fly across from Ailsa Craig.

Being outdoors gives me exercise, a chance to think and the chance to enjoy the beautiful appearance, behaviour and life histories of wild animals. ■

**“The BVA will continue to promote the value of vets to government and to demonstrate the commitment and expertise of the profession in addressing the contemporary challenges facing agriculture”**



*Sean admiring Hawaiian geese at the London Wetland Centre.  
(Photo: WWT London Wetland Centre)*



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